

You Are What You Think: The Development and Initial Examination of a New Measure  
of Weight Mindset

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## Dedication

This dissertation is dedicated everyone who has inspired me to do this research, both near and far...to every person I know is struggling with their weight or even just with themselves...to those who have taught me that it is okay to struggle...to those who have taught me that I am at my best when I am contributing to the creation of the type of world that I want to live in. Your existence and the hope for change is what has inspired me and will continue to inspire me each and every day.

## Abstract

There is growing body of research that suggests that individuals' beliefs about body weight, herein called mindsets, are associated with a variety of health-relevant outcomes including eating and exercise behavior (for a review, see Burnette, Hoyt, & Orvidas, 2017). Although research is mounting, the literature lacks clarity as to which beliefs about weight are most important for predicting these health-relevant outcomes or even how to consistently define weight mindsets. The primary aim of this dissertation was to examine the value of a new perspective on weight beliefs. Study 1 led to the development of the Weight and Resources Mindset Questionnaire (WARM), a new, empirically validated, 12-item, four-factor measure of weight mindset that determines the extent to which individuals 1) are content or not content with their weight, 2) believe weight is changeable, 3) are content or not content with their access to weight management resources, and 4) believe they can increase their access to weight management resources. Studies 2 and 3 were part I and II of an explanatory sequential design. Study 2, a quantitative study, demonstrated that latent profile analysis of the WARM resulted in eight weight mindset classifications, and that an examination of differences in weight-related attitudes and behaviors (e.g. fruit and vegetable consumption, weight bias internalization) across these eight mindsets revealed patterns of findings not possible with already existing measures of weight mindset. For Study 3, qualitative interviews provided insights into the histories and general weight-related experiences and beliefs of individuals across weight mindsets. These findings were then integrated with the Study 2 findings to generate descriptions and labels for each of the

eight weight mindsets. Together, these studies provide a new foundation for the systematic study of weight mindsets.

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## Introduction

The percentage of overweight and obese adults trying to lose weight has declined since the early 1990's (Snook et al., 2017). Although some researchers have appropriately argued that people should focus more on improving their health than reducing their weight (Bacon & Aphramor, 2011), the belief that behaviors such as eating healthful foods, avoiding unhealthful foods, and engaging in physical activity are associated with weight control is a primary reason that people engage in these health promoting activities (e.g. Phan & Chambers, 2016). Therefore, although the aforementioned decline in individuals trying to lose weight could be indication that people have turned their focus to improving their health, it is more likely to be an indication that people have given up not only on losing weight, but also on engaging in health behavior, as research shows that most dieters regain weight in the long term, even if they experience initial weight loss success (Mann, Tomiyama, Westling, Lew, Samuels, & Chatman, 2007). If nothing else, the fact that beliefs about body weight are so closely tied to health behavior indicates that understanding people's beliefs about weight management is paramount to understanding patterns of engagement in health behavior and how to most effectively promote and increase engagement in health behavior and positive health behavior change.

There is a long history in psychology supporting the idea that individuals' beliefs have an impact on their attitudes and behavior (e.g. Ross, 1989). There is also growing body of research that suggests that individuals' beliefs about body weight, herein called mindsets, are associated with a variety of health-relevant outcomes including eating and exercise behavior (for a review, see Burnette, Hoyt, & Orvidas, 2017). For example,

researchers examining almost 9,000 individuals using data from the 2007-2010 iterations of the National Health and Nutrition Examination Survey found that the belief that weight is not controllable is related to decreased exercise behavior and healthful eating and increased unhealthful eating (Parent & Alquist, 2016). Data from a separate nationally representative sample revealed that the belief that obesity is inherited is associated with decreased physical activity, fruit consumption, and vegetable consumption (Wang & Coups, 2010). Messages that describe obesity as a disease have been shown to be associated with decreased importance of health-focused dieting and reduced concerns about weight compared to an information-based weight management message (Hoyt, Burnette, & Auster-Gussman, 2014). These are only a few examples among many suggesting that research on weight mindsets is an important step to better understanding peoples' health behaviors and ultimately their mental and physical well-being. Although research is mounting, the literature lacks clarity as to which beliefs about weight are most important for predicting these outcomes or even how to consistently define weight mindsets.

The primary aim of this dissertation is to demonstrate the value of a new perspective on weight beliefs. Specifically, there is a need for a new, four-factor conceptualization and measure of weight mindset that distinguishes 1) whether individuals are content or not content with their weight 2) whether they believe weight is changeable 3) whether they are content or not content with their access to weight management resources 4) whether they believe they can increase their access to weight management resources. The primary reason for the creation of this measure is its potential for more accurate prediction of health and health behavior outcomes. The need

for this conceptualization will be demonstrated with three studies. Study 1 focused on scale development. Study 2 was a quantitative study focused on both using the newly developed scale as a means to quantitatively derive a new set of more specific weight mindsets and examining differences in weight-related beliefs and health behaviors across these mindsets. Finally, Study 3 was a qualitative study focused on gaining a better understanding of the individuals within each mindset including their perception of how they developed their mindset.

This manuscript is divided into four sections. The first section provides a description of the dominant perspective in the psychological literature on weight mindsets, the implicit theory perspective. It includes a brief summary of the literature on the relation between implicit theories and goal-directed behavior across domains with a particular focus on the effects of implicit theories of weight. Section two describes the particular issues related to weight mindset that need to be addressed to move this area of research forward. Section three describes a set of three studies used to create and validate a new measure of weight mindset, examine its relation to health-related phenomenon, and gain an enhanced understanding of the individuals who ascribe to each set of weight beliefs. The final section considers the implications of the results of these studies for future research on the association between mindset and health behavior.

### **The Implicit Theory Perspective**

Although weight mindsets are studied from a variety of different perspectives within psychology, one of the most common perspectives on weight mindsets is the implicit theory perspective. As I use it in this manuscript, a mindset is a pattern of thoughts that is elicited consistently in response to a specific stimulus or set of stimuli (Weiner, 1979).

Mindsets do not exist on their own, but instead are engaged with and used in relevant contexts when these stimuli are present. For example, one's weight mindset is not engaged in contexts in which body weight is not relevant for a given individual. Implicit theories are conceptually similar to constructs such as worldviews (Plaks, Grant, & Dweck, 2005), essentialist beliefs (Bastian & Haslam, 2007), and group entitativity (Rydell, Hugenberg, Ray, & MacKie, 2007). However, the implicit theory perspective is explicitly grounded on the distinction between two beliefs systems; individuals with an entity mindset assume that human characteristics such as competence, intelligence, or morality tend to be fixed, whereas individuals with an incremental mindset assume that these characteristics are not fixed and that they can be changed over time with effort (Dweck, 1999; Ross, 1989).

#### Implicit Theories and Behavior Change Related Processes

A primary aim in the implicit theories literature is to explain why some individuals successfully engage in the behaviors necessary to reach their goals whereas others do not (e.g. Dweck, 2000). Implicit theories researchers have tried to elucidate the root of these differences (for a review, see Burnette, O'Boyle, VanEpps, Pollack, & Finkel, 2013) by examining the role of individuals' beliefs about the stability and changeability of human characteristics (Molden & Dweck, 2006). The primary assumption in the implicit theories literature is that individuals with an incremental mindset should be more likely than those with an entity mindset to reach their goals because they are more likely to set goals focused on effort rather than an outcome, react more adaptively to challenging tasks and situations, and respond better after setbacks. I therefore focus on the evidence that implicit theories are related to individual differences



*in goal setting, reaction to challenges, response after setbacks, and goal achievement.*

The primary aim of this brief review is to assess the evidence that implicit theories are related to successful implementation of goal-oriented behavior, which serves as the basis for the application the implicit theories perspective to the study of weight management.

**Evidence of the relation between implicit theories and goal setting.** Dweck (Dweck, 1986; Dweck & Leggett, 1988) theorized that one's orientation toward a particular type of goal setting results from the mindset that individual holds. Most of the research on implicit theories and goal setting has focused on the distinction between two goal-setting orientations, learning goals that focus on developing or improving skills and performance goals that focus on demonstrating or proving one's skills (Burnette et al., 2013; Senko, Hulleman, & Harackiewicz, 2011). Goal orientation research has generally suggested that a learning goal orientation is associated with positive strategies that lead to better outcomes, whereas a performance goal orientation is associated with maladaptive strategies that lead to worse outcomes (Ames & Archer, 1988; Dweck & Leggett, 1988). Consistent with predictions made by Dweck (1986; Dweck & Leggett, 1988), researchers have found that individuals with an incremental mindset are more likely to set learning goals, goals related to enhancing and refining their skills and competence, and to conceptualize achievement contexts as opportunities to develop, (Dweck & Leggett, 1988; Robins & Pals, 2002). Individuals with an entity mindset are more likely to set performance goals, prefer to demonstrate rather than develop their skills and abilities, and conceptualize achievement contexts as tests of inherent competence rather than progress (Dweck & Leggett, 1988).

Although these studies suggest that implicit theories and learning goals are related, findings across domains have not been consistent, with some studies showing the inverse relation between implicit theories and goal setting orientations (e.g., Biddle et al., 2003), some studies demonstrating null effects (e.g. Dupeyrat & Mariné, 2005; Sarrazin et al., 1996), and still others demonstrating moderated effects (Leondari & Gialamas, 2002), suggesting that there might be characteristics in individuals' mindsets beyond the incremental versus entity distinction that explain the mixed findings.

### **Evidence of the relation between implicit theories and reaction to challenges.**

The implicit theory perspective would suggest that individuals with an incremental mindset should respond more adaptively to challenging situations and tasks than those with an entity mindset because their self-esteem is dependent on whether they effortfully engage in a given task not on whether they fail or succeed at the task. For those with an incremental mindset, a challenge represents an area in which they can improve their ability. For those with an entity mindset, a challenge represents the threat of demonstrating an inherent lack of ability. Specifically, compared to those with an incremental mindset, those with an entity mindset tend to view effort as an indication of underlying ability, with the use of less effort signaling greater ability (Dweck & Leggett, 1988). The entity mindset therefore leads individuals to be inclined to invest less effort because in event that they fail, they can blame lack of effort rather than lack of ability. There is some evidence suggesting that individuals with an entity mindset are more likely to use more maladaptive strategies in the face of threatening situations or potential setbacks compared to those with an incremental mindset (for a review, see Burnette et al., 2013). Self-handicapping is a specific anticipatory strategy in which individuals engage

in counterproductive behavior in relation to a certain goal that they wish to attain to conceal potential incompetence even before an individual actually experiences a negative outcome as a means of ego protection in case of poor performance (Garcia & Pintrich, 1994; Jones & Berglas, 1978; Prapavessis & Grove, 1998; Tice, 1993). Compared to those with an incremental mindset, individuals with an entity mindset are more likely to self-handicap (Ommundsen, 2001; Shih, 2009). Individuals with entity mindsets have also been shown to be more likely to respond to anticipatory stress with emotion-focused coping and behavioral disengagement, whereas individuals with an incremental mindset have been shown to be more likely to use problem-focused coping and sustained engagement resulting in better performance (Compas, Connor-Smith, Saltzman, Thomsen, & Wadsworth, 2001; Doron, Stephan, Boiché, & le Scanff, 2009; Shih, 2009).

However, researchers have found important moderators of these effects. Certain aspects of individuals' self-beliefs and self-perceived competence seem to affect how mindset relates to how they respond to challenges. For example, the use of self-handicapping has been shown to depend on whether individuals do or do not invest their self-worth in achieving success in a given domain (Niiya, Brook, & Crocker, 2010). Specifically, individuals with an incremental mindset self-handicap more if the task is related to a domain from which they derive their self-worth compared to if it is from a domain from which they do not derive their self-worth (Niiya et al., 2010). This is especially true in cases in which they are likely to fail, such as when the task is difficult (Niiya et al., 2010). Relatedly, self-perceived competence has also been shown to moderate the relation between implicit theories and reactions to challenges. Specifically, among individuals with low perceived competence in a given domain, those with an

incremental mindset are less likely to self-handicap than those with an entity mindset (Ommundsen, 2001). However, for those with high perceived competence, there is no relation between implicit theories and self-handicapping (Ommundsen, 2001). These studies suggest that the relation between implicit theories and self-handicapping may depend on individual's perceived competence in a given domain and whether that individual derives their self-worth from achievement in the domain, again suggesting that important beliefs other than the distinction between an incremental and entity mindset may be key to understanding an individual's response to a challenge.

#### **Evidence of the relation between implicit theories and response after**

**setbacks.** The implicit theories perspective would suggest that those with an incremental mindset should respond better to failure than those with an entity mindset because failure serves primarily as an indicator of the area in which they need to focus their future efforts rather than evidence of a lack of competence. In line with this perspective, there is evidence that after a setback those with an incremental mindset engage in more productive coping strategies and invest more effort in the task compared to those with an entity mindset (Burnette et al., 2013). For instance, when individuals with an incremental mindset experience setbacks or failures, they are less likely than those with an entity mindset to adopt helpless-oriented strategies, such as emotion-focused coping, and more likely than those with an entity mindset to adopt mastery-oriented strategies, such as problem-focused coping (e.g. Chen & Pajares, 2010; Dweck, 1999; Dweck & Leggett, 1988; Hong, Dweck, Chiu, Lin, & Wan, 1999; Mangels, Butterfield, Lamb, Good, & Dweck, 2006; Nichols, White, & Price, 2006; Pintrich, 2000; C. K. J. Wang, 2001; C. K. J. Wang, Chatzisarantis, Spray, & Biddle, 2002). Theoretically, because individuals with

an incremental mindset believe they can improve, they do not feel the need to ascribe their failures to an inherent lack of ability; instead, they are able to view failures as opportunities to change and grow, resulting in maintenance of their self-esteem even after setbacks (Robins & Pals, 2002).

However, there is evidence to suggest that this is not always the case. In contexts in which only performance goals are emphasized, entity mindset actually led to increased effort after failure compared to an incremental mindset (El-Alayli & Baumgardner, 2010). Similar to individuals' responses to challenges, evidence from some studies of individuals' responses to setbacks suggests that whether one derives their self-worth from the domain in question affects responses. Specifically, when individuals with an incremental mindset whose self-worth is highly contingent on a given domain do not have the opportunity to self-handicap before a difficult task, they make more internal attributions for their failures and exhibit lower post-failure self-esteem (Niiya et al., 2010). This suggests that knowing whether individuals derive or are likely to derive their self-worth from the domain in question is important to understanding the effect of implicit theories on their responses to setbacks. It further suggests that an incremental mindset may be most beneficial in domains for which individuals do not specifically derive their self-worth.

#### **Evidence of the relation between implicit theories and goal attainment.**

Several studies suggest a direct link between implicit theories and goal attainment. Incremental mindsets have been shown to be associated with improvements in achievement scores (Good, Aronson, & Inzlicht, 2003) as well as upward trajectories in GPA over time for both students in junior high school (Blackwell, Trzesniewski, &

Dweck, 2007) and college (Aronson, Fried, & Good, 2002). However, few researchers have examined goal attainment outside of the academic context. Furthermore, several researchers have pointed out that the outcome is measured long after the point of intervention in these studies. They argue that when the outcome is so distal from the intervention, it is difficult to determine whether it is truly a stronger incremental mindset that lead to these better outcomes or whether the intervention led the individual to engage in other activities such as studying more or becoming more involved in school programming regardless of whether mindset really changed as a result of the intervention (Miller, Dannals, & Zlatev, 2017)

#### Implicit Theories of Weight and Behavior Change Related Processes

Research on implicit theories of weight has drawn increasing attention since Burnette's (2010) article introducing a measure of implicit theories of weight management, which distinguishes between individuals who believe that body weight is changeable and can be managed (incremental) and those who believe that body weight is fixed (entity). Traditionally, implicit theories of weight are measured using a standard 6-item implicit theory of weight scale, where statements such as "You have a certain body weight, and you can't really do much to change it." are rated from (1) strongly disagree to (6) strongly agree. These six items are then scored using Dweck et al. (1995)'s procedure, which is designed to focus on individuals with unambiguous implicit theory scores. Scores on the 6-item implicit theories measure are averaged and those whose mean score is 3.00 or below are categorized as having an entity mindset and those with a mean score 4.00 or higher are categorized as having an incremental mindset. Based on findings from other domains, the development of an implicit theories approach to weight management

was predicated on the premise that compared to individuals with an entity mindset, those with an incremental mindset should be more likely to be able to successfully manage their weight, and when necessary, their weight loss goals. The underlying premise is that individuals with an incremental mindset are more likely to set goals focused on weight-related processes (e.g. health behaviors) rather than weight itself, react more adaptively to the challenges that come with managing or losing weight, and respond better after weight-regain and other weight-management related setbacks. Similar to research on general implicit theories, research on the effects of implicit theories of weight has *focused on goal setting, reaction to challenges, response after setbacks, and goal achievement.*

#### **Evidence of the relation between implicit theories of weight and goal-setting.**

There has only been one study examining the relation between implicit theories and goal-setting (Beruchashvili, Moisis, & Heisley, 2014). This was a qualitative study in which researchers interviewed 25 female dieters currently enrolled in Weight Watchers. These women were categorized as having either an entity or incremental mindset using the traditional implicit theories classification procedure and the general implicit theories scale, not the weight-specific implicit theories scale (Dweck et al., 1995). This scale includes items such as, “Everyone is a certain kind of person and there is not much that can be done to really change that” (Dweck et al., 1995). Based on the evidence from other domains, one would expect individuals with an entity mindset to be more likely to set performance-avoidance goals and those with an incremental mindset to be more likely to set learning-approach goals. Indeed, Beruchashvili et al. (2014) found that dieters with an entity mindset framed their goals in terms of outcomes that they could avoid by losing weight (e.g., avoid negative judgements of my body weight), whereas dieters with an

incremental mindset were more likely to frame their goals in terms of process and what they will gain (e.g. increase my weight-management competence). This study provides preliminary evidence that implicit theories are associated with both learning versus performance and approach versus avoidance goal-setting orientations.

It is, however, important to note that all of the women were enrolled in Weight Watchers, likely viewed themselves as overweight, and perhaps thought of themselves as low in weight-management-related competence. As noted, across domains, differences between those with incremental and entity mindsets are magnified when competence is perceived to be low in a given domain. In addition, it is only a single study and implicit person theories rather than implicit theories of weight were measured, so little is known about these individuals' beliefs specifically about the extent to which they see weight as something that is fixed or changeable. Finally, it remains unknown whether differences in goal setting lead to different outcomes. For instance, are dieters with an entity mindset successful when they set avoidance-outcome goals? If so, it would suggest that mindsets elicit different goal setting strategies but are unrelated to differences in relevant outcomes.

**Evidence of the relation between implicit theories of weight and response to challenges.** There is only one study to date that examines the relation between implicit theories and response to weight management challenges (Beruchashvili & Moio, 2013). This study used the same interviews and the same implicit theories measure as the single study examining implicit theories of weight and goal setting (i.e. Beruchashvili et al., 2014). Based on findings from the general implicit theories literature, if perceived weight management competence is low, one would expect individuals with an entity mindset to



put less effort into planning and to engage in behaviors that could be identified as self-handicapping compared to those with an incremental mindset.

Although this study did not have a direct measure of response to challenges, the researchers examined women's responses to creating weight loss plans in the context of Weight Watchers. They found that those with an entity mindset were more reluctant to make specific plans for weight loss and instead talked mostly about why planning is stressful and effortful for them, whereas individuals with an incremental mindset were more likely to create specific plans and to view planning as a means of avoiding potential obstacles and challenges that might arise (Beruchashvili & Moio, 2013). These findings offer preliminary evidence that those with an incremental mindset may be more likely to commit to process related planning and that those with an entity mindset engage in self-handicapping, in part, by avoiding making a specific weight loss plan altogether. Given the sparse literature in this area, research is needed to examine responses to specific weight-management challenges, such as the presence of palatable food an individual is trying to avoid, rather than just effort put into planning. Similar to goal setting, research is also needed examining whether these strategies are successful for individuals.

**Evidence of the relation between implicit theories of weight and response to setbacks.** Given prior work, one would expect individuals with an incremental mindset to respond to weight-management related setbacks with more positive coping strategies compared to those with an entity mindset. Four studies have examined the relation between implicit theories of weight and response to dieting setbacks; one study of a hypothetical setback, one study of an experienced setback, one study of a hypothetical

setback using experimentally manipulated mindsets, and one longitudinal intervention study.

Using a sample of college students, Burnette (2010) examined responses to a hypothetical setback in which participants imagined that they had embarked on a diet, but in the end, had gained instead of lost weight. She found that those with a stronger entity mindset reported decreased success expectations for future dieting attempts and increased avoidant coping in response to the setback. Success expectations also mediated the relation between implicit theories and avoidant coping. Specifically, entity mindset was associated with decreased success expectations that in turn predicted increased avoidant coping. In this study, implicit theories of weight were measured as a continuous variable using Burnette's (2010) implicit theories of weight scale. Results from a study of individuals trying to lose weight further elucidate the relation between implicit theories and both future expectation for dieting success and avoidant coping after setbacks. Participants reported their implicit theories of weight at time one, which was treated as a continuous variable. Eight weeks later at time two, participants responded to measures about future expectations for dieting success and avoidant coping while reflecting on a dieting-related setback or challenges they experienced during the eight weeks. The results indicated that a stronger incremental mindset was associated with increased future expectations for dieting success and decreased avoidant coping despite experiencing dieting-related challenges (Burnette, 2010). Results from an experimental study showed that participants who read an article that espoused an entity mindset of body weight responded to the hypothetical dieting setback with decreased confidence that they would succeed on future dieting attempts and were more likely to report that they would

disengage with their dieting goal compared to those who read an article than espoused an incremental mindset of body weight (Burnette, 2010).

Building on this work, researchers conducted an implicit theories-based intervention to promote weight loss (Burnette & Finkel, 2012). Participants, who were all trying to lose weight, were divided into three intervention groups: an incremental mindset intervention group, a knowledge intervention group, and a control group. Each group received five bi-weekly emails. The incremental mindset intervention focused on the message that weight is changeable and that genes do not determine body weight. It included evidence supporting the validity of an incremental mindset of weight as well as examples of people who have successfully lost weight. The knowledge intervention focused on lifestyle, exercise, and nutrition tips as well as strategies for achieving one's weight loss goals and sustaining one's weight loss plans. Individuals in the control condition received emails, but they did not provide any information related to weight management. Implicit theories of weight was measured at time one, and setbacks experienced during the 12 weeks were self-reported by participants at time two and rated for severity by two independent raters. Overall, those in the knowledge condition lost an average of 1.83 pounds during the 12-week intervention, compared to a negligible gain of 0.09 pounds in the incremental condition and a gain of 3.11 pounds in the control condition. The incremental and knowledge conditions did not differ significantly in terms of overall weight loss. However, for one specific group of individuals, namely among those who experienced severe setbacks (e.g. setbacks rated as likely to cause weight gain), those in the incremental condition were least likely to experience weight gain.

Although there is evidence that individuals with an incremental mindset respond

more adaptively to setbacks than do those with an entity mindset, there is also evidence that this relation is dependent on a variety of factors. First, although two of the four studies examined individuals trying to lose weight, two of the studies in Burnette's (2010) paper on implicit theories of weight used samples of college students, who were, on average, normal weight and therefore may view their weight management competency as high and weight management as a relatively un-challenging prospect. Second, the conditions under which incremental mindsets are beneficial need to be more closely examined. Burnette and Finkel (2012) argue that the incremental intervention was successful because among those who experienced the most severe setbacks, those in the incremental condition experienced more positive outcomes. However, this might suggest that the benefit of an incremental mindset only emerges in the face of severe setbacks. In addition, studies are needed that examine actual behavioral responses to setbacks; three studies used self-reports of what one would do after a setback, and the last study used weight as a proxy for response to setbacks. In sum, although research on implicit theories of weight does seem to suggest that those with an incremental mindset may respond more adaptively to setbacks, questions remain as to whether this is the case overall or whether an incremental mindset is more adaptive for certain individuals under certain conditions.

#### **Evidence of the relation between implicit theories of weight and goal**

**attainment.** Based on general findings from research on implicit theories, we should expect that compared to an entity mindset of weight, an incremental mindset of weight should be associated with increased goal attainment. The results of the only longitudinal study examining the effect of implicit theories of weight on body weight showed that the incremental intervention did not lead to weight loss (Burnette & Finkel, 2012). However,

for those in the incremental condition, increase in incremental mindset was associated with decreased weight, suggesting that those individuals' who increased the strength of their incremental beliefs were more successful, although the origin of the increase in incremental beliefs is not known. In other words, did perceiving weight loss success lead to increased incremental beliefs over time or did an increase in incremental beliefs as a result of the intervention lead to more successful weight loss? However, work examining implicit theories of weight in a nationally representative sample showed that BMI did not differ based on people's weight mindset after controlling for sociodemographic characteristics such as age and SES (Auster-Gussman & Rothman, 2018). Taken together, these studies suggest, at best, weak evidence that an incremental mindset is associated with increased goal attainment in weight management.

Studies examining implicit theories of weight that focus on weight management related behavior itself as the measure of goal attainment have also found mixed effects. Two studies have demonstrated a direct relation between implicit theories and health behavior. In one study, which used a novel 15-item measure of implicit theories of weight, participants with stronger incremental mindsets consumed fewer calories from M&Ms, the unhealthy food served to study participants, than did those with more entity beliefs, though the number of calories consumed from raisins, the healthy food served to participants, did not differ (Ehrlinger, Burnette, Park, Harrold, & Orvidas, 2017). A second study replicated these results using a mindset message manipulation rather than naturally occurring mindset.

Two other studies have found an indirect effect and no effect of implicit theories on weight management related behavior. Results from a study of self-reported eating over

a one week period using the 15-item measure of implicit theories of weight showed that although implicit theories did not directly predict percent calories from fat, implicit theories did indirectly predict calories from fat through a mediator, nutrition self-efficacy, such that stronger incremental mindset predicted increased nutrition self-efficacy and, in turn, decreased consumption of calories from fat (Ehrlinger et al., 2017). Other work using a nationally representative sample showed that after controlling for sociodemographic characteristics, consumption of healthy and unhealthy foods did not differ by weight mindset, though incremental theories was associated with a small increase in exercise behavior (Auster-Gussman & Rothman, 2018).

Taken together, these findings highlight the need for a better understanding of the effect of weight mindsets on weight-related goal attainment whether the outcome of interest in body weight or weight-related health behavior. Some studies suggest the presence of direct links between implicit theories and weight-related goal attainment whereas others find no direct links or only find a relation through a mediator. It is difficult to make an argument that implicit theories of weight lead to better outcomes unless the outcomes of interest are better defined, and it is clearer what outcomes should be expected based on weight mindset.

**Summary.** Although there is some evidence suggesting a relation between implicit theories of weight and self-regulation, the results across studies are inconsistent. There is evidence to suggest that implicit theories is related to goal setting, but this evidence rests on a single qualitative study of women who both believe their weight is too high and are already enrolled in Weight Watchers. The relation between implicit theories and response to challenges rests on a single qualitative study of women that uses

the same sample of individuals. Findings from four studies examining implicit theories of weight and response after setbacks suggest that an incremental mindset may be beneficial in terms of positive coping after setbacks, but two of these studies use hypothetical setbacks, and the only longitudinal studies show that an incremental intervention is only advantageous for those who experience severe setbacks and challenges in weight loss. Finally, although several studies suggest a link between implicit theories and goal attainment, these studies use a variety of different measures and manipulations of implicit theories of weight and a variety of different outcomes, some of which relate directly to implicit theories of weight and some of which do not. Although there is a meta-analysis on the role of implicit theories across domains (Burnette et al., 2013) and a number of papers examining implicit theories of weight (e.g. Auster-Gussman & Rothman, 2018; Burnette, 2010; Ehrlinger et al., 2017), systematic discussion of the meaning and implications of conducting implicit theories research in the domain of body weight is lacking. As a result, the conceptual foundations of research in this area have remained vague. In turn, this has led to confusion and misunderstandings that have made it difficult to directly address the conceptual challenges that research in implicit theories of weight confronts.

### Research Agenda in Weight Mindset

There are a variety of issues that need to be addressed in the weight mindset literature. First, there is a need for a consolidated measure of weight mindset that clarifies the conceptualization of the meaning of having a given mindset. Second, it is necessary to understand how different weight mindsets relate to differences in important weight-related constructs such as individuals' current health behaviors, living environments,

social networks, and weight-stigma related beliefs. Third, it is necessary to create rich descriptions of these mindsets including individual's perceptions of how and when they developed and their relation to health and weight-management related beliefs and behaviors. These are the targets of my proposed research: (1) *create a theoretically-based measure of weight mindset using best practices in scale development and use it to empirically determine a new set of weight mindset classes*, (2) *examine differences in weight and health-related behaviors and beliefs across these weight mindsets*, and (3) *gain insight into individuals' perceptions of when and how their beliefs developed, and how they relate to their current weight-related behavior and future plans*. The research agenda for each of these targets is summarized below.

### **Development of a Four-Factor Measure of Weight Mindset**

To increase the utility of studies of weight mindset, researchers need an empirically reliable and valid measure that delineates the specific set of beliefs that constitute a given weight mindset that can be used consistently across studies. The literature on weight mindset has been relatively mute when it comes to articulating the elements that underlie an incremental versus an entity mindset beyond the common distinction that those with an incremental mindset tend to believe weight is changeable whereas those with an entity mindset believe it is fixed (e.g. Burnette, 2010). Furthermore, across studies, implicit theories of weight are currently measured using a variety of different measures which are scored in a variety of different ways. Researchers need to be clearer about which beliefs are being measured and aim to measure those beliefs that are most likely to affect subsequent behavior. To be effective, I argue that this measure must: (1) *distinguish between a person's belief that their weight is*



*changeable and the belief that their capacity to manage their weight is changeable, (2) include beliefs about whether one is content with their weight and with their capacity to manage their weight.*

**A distinction between weight itself as changeable versus the capacity to manage one's weight as changeable.** One of the primary goals for a new measure of weight mindset would be to distinguish between individuals' beliefs about the changeability of body weight itself and about the processes associated with managing one's weight. One's belief about whether body weight is changeable or fixed seems to be comprised of two beliefs, one about body weight and one about weight management processes. This distinction is not unique to body weight, but the implications of it seem more relevant in this domain. For example, if one has an incremental mindset of intelligence, that person believes that people, with effort, can become more intelligent. However, more than likely, even someone with an entity mindset of intelligence, someone who believes that people are either smart or not smart, still believes that people can engage in the process of learning new things. They simply believe that some people learn new things more slowly than others. The belief that intelligence is changeable is about being able to increase the rate at which an individual can learn - that someone can become better at learning (i.e. more intelligent), not whether a person can literally learn new things.

In the domain of body weight, finding an analogue to this relation is complicated. An incremental mindset of weight, the belief that weight is changeable, seems less analogous to believing that intelligence is changeable, and instead more similar to believing that people can learn new things. Specifically, it seems to reflect the belief that

weight management is possible rather than that someone can increase their capacity or ability to manage their weight. This could explain why nearly 80% of individuals report an incremental mindset of weight (Auster-Gussman & Rothman, 2018). To be analogous to intelligence, an incremental mindset of weight should be a measure of the belief that the capacity to manage one's weight is changeable or that one can become better at managing one's weight. Or, better yet, a new measure should distinguish clearly between the belief that weight is changeable and that one's weight management ability is changeable.

A measure created based on this conceptualization should result in a more accurate depiction of people's beliefs about both the possibility of managing their weight and whether they could improve their ability. As noted, prior work examining implicit theories of weight in a nationally representative sample showed that nearly 80% of individuals believe that weight is changeable (Auster-Gussman & Rothman, 2018). The most recent published studies of implicit theories of weight report that they needed to correct for skew toward increased incremental theories in each sample (Ehrlinger et al., 2017). This draws into question the usefulness of implicit theories of weight as it is currently measured given that most people espouse an incremental theory of weight, yet many individuals still struggle to manage their weight.

**The inclusion of self-perceived competence.** Measurement of implicit theories of weight would also benefit from explicitly measuring individuals' self-perceived weight management competence given the evidence across domains that individuals with an entity mindset are successful in reaching their goals as long as they perceive themselves to be highly competent (Hong et al., 1999). For example, research on the relation between

implicit theories and perceived competence in sport found that holding an entity mindset predicted maladaptive goal-setting only when perceived competence was relatively low (Wang, Liu, Lochbaum, & Stevenson, 2009). This suggests that entity mindset should only predict maladaptive behavior for those who perceive their weight management competence to be low.

In the implicit theories of weight literature, individuals with an entity mindset are described as believing that body weight is something that is fixed, and therefore that they are destined to remain at their current weight. However, the prototype of this individual is someone who is overweight and unhappily stuck at their current weight. To be sure, this may be the case, but the prototype of an individual who believes that weight is relatively stable and is normal weight is overlooked almost completely. Rather than being overlooked, one's current self-perceived competence should instead be included as a defining feature of weight mindset. It is, however, not straightforward to conceptualize self-perceived competence in weight. In other domains, competence seems to represent an individual's contentedness with their current level of ability or state. I argue that for body weight, this is best represented simply by asking whether one is content with their current weight and their current capacity to manage their weight.

**Clarity as to whether the referent is the self.** To date, measures of weight mindset have assessed the endorsement of beliefs such as, "You have a certain body weight and you can't really do much to change it." It is not clear whether the referent is oneself, people in general, or, perhaps, the participant is thinking of some significant individual in their life who has either successfully changed their weight or even has a genetic condition precluding weight change. This is important given that the measure is

used to predict an individual's behavior and yet beliefs may change as the more salient referent changes. Researchers examining implicit theories of intelligence have shown that a measure that asks individuals to report their self-beliefs is a better predictor of outcomes including motivation and achievement than a general measure of implicit theories of intelligence (De Castella & Byrne, 2015). This suggests a need for a measure of implicit theories of weight that clearly indicates the individual themselves as the referent.

There is great importance in understanding people's mindset as it relates to weight, and this endeavor should begin with the creation of a measure and a clear delineation of what is included in the construct 'weight mindset' so that scholars can move from a rich understanding of the contents of the construct to a clear model of how it should play a role in the prediction of health and health behavior. Specifically, this new measure should be clear that the referent is the self, distinguish between the belief that weight is changeable and the belief that one's weight management capacity is changeable, explicitly include self-perceived competence, and result in a more useful distribution of mindsets.

### **Prediction of Health and Weight Related Behaviors and Outcomes**

One of the primary reasons for the creation of the four-factor measure of weight mindset is because of its potential utility in the prediction of health and weight related behavior and outcomes. At present, most studies are predicated on the fact that an incremental mindset is universally beneficial despite the mixed evidence that this is the case. Yet, an incremental mindset can have a detrimental effect on some individuals. For example, among highly obese individuals, a stronger incremental mindset predicted more

body image concerns, including shame and body-dissatisfaction (Burnette, Hoyt, Dweck, & Auster-Gussman, 2018). This may be a result of the fact that incremental beliefs are associated with more internal attributions for failures, thereby placing the blame on the individual (Hong et al., 1999). Prior work showed that body weight, fruit consumption, and vegetable consumption did not differ between people with an incremental versus an entity mindset when controlling for sociodemographic characteristics (Auster-Gussman & Rothman, 2018).

Findings like these suggest that the distinction between an incremental and entity mindset may not be adequate to understand and predict weight-management and health outcomes. In particular, the new set of mindsets based on the proposed four-factor scale should not only allow researchers to articulate the elements that underlie each weight mindset but also specify those constellations of beliefs that are most predictive of certain positive and negative health outcomes. For example, research is needed that can identify the psychological and behavioral consequences of simultaneously being not content with one's current weight and believing that weight is fixed.

### **A Process Orientation of Weight Mindset**

The need for a process orientation in weight management mindset is based on the fact that mindset is not limited to an abstract summary of one's beliefs. Instead, weight management mindset proceeds from the sum of one's idiosyncratic experiences, from knowledge, from routines, from intelligence, from culture, or from one's desires and motivations. With this point of view, it seems quite relevant to investigate how weight mindsets develop as well as how mindsets are sustained or transformed over time.

The lack of a process orientation in the weight mindset literature may have

emerged because the initial empirical studies emphasizing the effects of weight mindset on a variety of outcomes were fruitful enough that researchers had few incentives to examine the development of mindsets or to fully articulate the processes that determine how different mindsets lead to these outcomes. Weight mindsets are currently treated in the literature as hypothetical implicit mental constructs that exist in the mind of the individual. Most research on weight mindset and weight loss in general focuses on the individual's role within the weight loss and, in particular, the premise that some individuals think differently than other individuals and that those who adopt the right mindset are successful (Burnette & Finkel, 2012).

The articulation of a process orientation to explain weight mindset should focus on factors that relate to perception and interpretation of the context at the moment the specific behavior is to take place as well as factors that relate to the idiosyncratic histories that people bring to these moments from their past experiences, their genetics, and their specific goals. For example, an individual's mindset could originate from idiosyncratic factors and events that predate an individual's weight management efforts, such as interactions with friends and family and a lifetime of exposure to weight-relevant experiences and messages. It could result from environmental conditions that reward individuals with a certain mindset (e.g. eat less in a food rich environment) or from conditions that encourage the expression and development of such a mindset (e.g. having peer social support).

There is some evidence regarding the development of mindsets in other domains. Students who were told they are smart or talented were more likely to develop fixed mindsets, whereas those who were praised for working hard or for choosing positive

strategies were more likely to develop growth mindsets of intelligence (Yeager & Dweck, 2012). This suggests that how children are praised may play a role in the development of mindsets. However, if parents talk about weight at all, they tend to focus on the negative physical implication of overweight when talking about weight rather than praising their children (Thomas, Olds, Pettigrew, Randle, & Lewis, 2014), suggesting that examining patterns of parental praise is unlikely to be a fruitful endeavor. However, it does suggest that weight related messaging in childhood is likely to be related to development of one's weight mindset.

Researchers have also suggested that mindsets can be more easily changed during times of transition, such as the transition to college (Tamir, John, Srivastava, & Gross, 2007), and a number of scholars have shifted individuals' theories in experimental research (e.g., Burnette, 2010; Hong et al., 1999) and temporarily shifted people's implicit theories in longitudinal studies (e.g. Blackwell et al., 2007; Burnette & Finkel, 2012). This suggests that although mindsets may be formulated in childhood, they may continue to change and develop over the life course, highlighting the importance of examining changes in mindset over time.

The goal of examining mindset this way is to articulate not only how, when, and why interactions between cognitions and environment play a role in the development and transformation of weight mindsets, but also how, when, and why mindsets are used and come to influence an individual's weight management relevant decision-making and behavior. This point of view draws attention not only to the complex dynamics that influence human behavior, but also to the many factors and dynamics that potentially

constrain human cognition at the level of the individual, interpersonal interaction, or society (Kahneman & Tversky, 1996).

### Project Overview

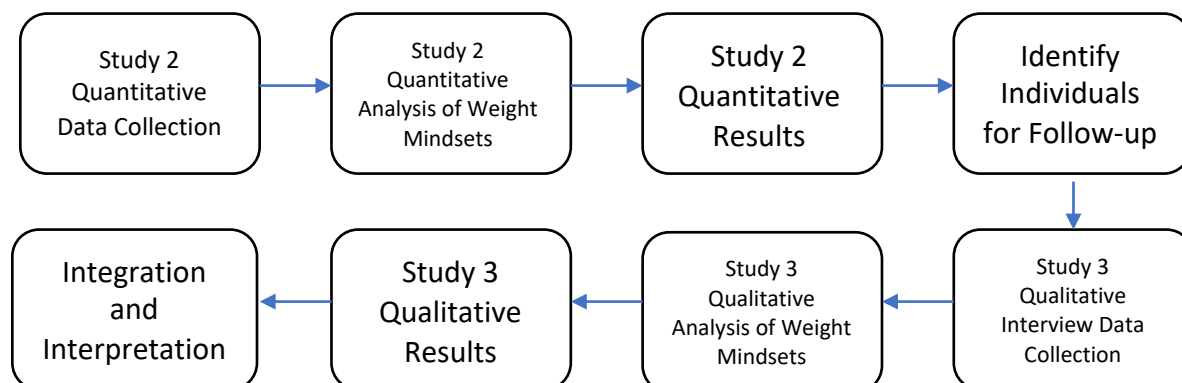
To advance research on mindset in the context of weight management, a series of three studies were conducted to meet the following goals:

- (1) Create and validate a new weight mindset measure that includes self-perceived competence and distinguishes between the belief that body weight is changeable and the belief that weight management capability is changeable and use this measure to empirically derive a new set of mindset classes using latent profile analysis (Studies 1 and 2),
- (2) examine differences across these classes in terms of health behaviors, maladaptive eating habits, weight stigma and self-stigma, perceived food environment, social norms, and demographics (Study 2),
- (3) Consider mindsets from a process orientation, including how they develop, are sustained, and vary across context and time, including individual differences in the extent to which they vary across context and time (Study 3)

Each of the three studies was designed to contribute to an overall understanding of the development weight mindsets and their effect on health and health behavior. Study 1 was a rigorous, multi-phase, scale-development study focused on the creation of the four-factor Weight and Resources Mindset Questionnaire (WARM). After the WARM was developed, an initial latent profile analysis will be conducted. Latent profile analysis (LPA) is a statistical tool that allows researchers to examine the number of patterns of beliefs individuals hold across any given set of items. It is used when researchers want to



categorize individuals within a dataset based on their response pattern to a given set of items with those with similar response patterns being categorized together. In this case, LPA was used to examine the number of classes that emerge of individuals that differ in terms of patterns of endorsement of the WARM. This tool had not been used previously as a means of determining mindsets, which were previously determined simply by distinguishing between those who were high versus low in endorsement of the belief that weight is changeable. Study 2 and Study 3 are part 1 and part 2 of a mixed-methods sequential explanatory design (See Figure 1). Study 2 was a quantitative study which both re-tested the WARM and subsequent LPA in a new sample of individuals, leading to a new set of weight mindsets that were quantitatively derived using LPA. Differences across a variety of outcomes including health behavior and weight-related beliefs were then examined across these mindsets. Study 3 was an explanatory qualitative study aimed at explaining and elaborating the quantitative results of Study 2 (Creswell & Plano Clark, 2007) with a particular focus on better understanding the origins of weight mindset and to more richly understand individuals' weight-related beliefs. A key strength of these studies that they will not only provide theoretical support for the use of a new weight mindset scale, but also strong empirical support for the development of the Weight and Resources Mindset Questionnaire (WARM).

Figure 1. *Mixed-methods explanatory sequential design*

Development and Validation of the Weight and Resources Mindset Questionnaire

(WARM)

The current measure of weight mindset most frequently used is a modified version of implicit theories scales used in other domains, with the main difference being that “weight management” is inserted into scale items that used to have the word “personality” or “intelligence”. Little scale-development preceded the creation and adoption of this measure. Scale development of the WARM was done best practices in scale development. This began with an extensive item development protocol (Pilot Study) followed by rigorous quantitative analysis of the full scale and at the item level (Study 1).

### **Item Development**

The WARM is proposed to have four factors: 1) content or not with one’s weight, 2) the belief that weight is changeable, 3) content or not with one’s weight management resources to manage his/her weight, and 4) the belief that one can increase their access to weight management resources. To begin item development, specific operational definitions of each of the four factors were developed by myself and two research assistants:

***Content with weight.*** The extent to which an individual is satisfied with their weight including how it affects their daily life.

***Weight is changeable.*** The extent to which one believes that weight is a product of one's choices and volitional behaviors rather than being determined by factors outside of their control.

***Content with weight management resources.*** The extent to which a person believes that they have all the resources they need to manage their weight to their satisfaction.

***Can increase access to weight management resources.*** The extent to which a person believes that they can increase their access to the weight management resources and knowledge that they need.

Each research assistant then separately developed a pool of 8-10 items intended to tap each of the four factors, for a total of 16-20 items per factor. The research team narrowed the pool down to six items per factor and then this set of 24 items was examined by a scale development expert. Changes were made to the items based on expert feedback. Content validity was then assessed by two doctoral level social psychologists who are experts in weight beliefs and health behavior change. A final round of revisions to the items was made to minimize features that were not theoretically relevant or to improve clarity, leaving a final pool of 24 revised items (see Appendix A).

#### Pilot Study: Clarifying the Nature of Weight Management Resources

In developing the items for the WARM, there was concern that responses to the items asking whether one can increase their access to weight management resources will be influenced by the specific resource that comes to mind for a given participant. For

example, someone might feel they do not have the financial resources they need to manage their weight, but when they respond to whether they can increase their access to weight management resources in general, they might say that they are able to because they can increase their access to information, not because they think they can increase their access to financial resources. The concern was that, if this was the case, people may not believe the primary resource that they are lacking can be increased, suggesting that they do not believe that they can ameliorate the lack of resources causing them to be less able to manage their weight. Therefore, we conducted a pilot study to examine how participants understand the term “weight management resources” as well as their thoughts when they respond to the items asking whether they can increase their access to weight management resources.

**Participants, procedure, and materials.** This pilot study included 50 individuals recruited via Amazon Mechanical Turk. This sample size was selected to ensure that I captured individuals who both are content and are not content with their current weight management resources and do and do not believe they that can increase their access to weight management resources. To be eligible for participation, interested individuals had to be over 18 years of age, live in the United States, speak English, and have an MTurk completion rate of at least 95%, a specification that can be selected using Amazon Mechanical Turk. Participants responded to the 24-item WARM, demographic questions, height, and weight. In addition, they answered a series of questions about their thoughts as they respond to the WARM. Specifically, after completing the WARM they were asked: 1) “As you answered the questions about whether you could increase your access to weight management resources, which resources were you thinking about?”, 2) “Why

do you believe or not believe that you could increase your access to these resources?”, 3) “When we asked you about weight management resources, we asked you about information, time, money, and support. Are there other resources you believe we should have also asked you about?”, and 4) “What is the thing that you most believe would help you manage your weight?” with response options of more time, more money, more motivation, more social support, more information, and a spot for participants to fill in other responses.

**Results and conclusion.** When asked what resources they had brought to mind, participants primarily reported weight management resources related to money (e.g. tight budget), time (e.g. more time to exercise), information (e.g. google nutrition facts), and support (e.g. weight watchers). The only other resource several participants mentioned was some version of willpower as a resource. When asked why they believe or do not believe they could increase their access to weight management resources, participants primarily indicated either their own willpower or external barriers such as childcare as the main reasons why they do not believe they could increase their access to weight management resources. Several participants noted that although they could not increase their access to, for example, fruits and vegetables, they could increase their access to weight management resources by gathering more information using sources like Google, but that this would not increase their ability to manage their weight. When asked whether there were resources beyond information, time, money, and support that should have been included, 37 of the 50 participants indicated that money, time, information, and support covered the categories of resources that they had considered. The remaining participants indicated motivation or conversely laziness as the primary resource that was

not included among those four. When asked what the one thing is that would most help them manage their weight, participants indicated that the most common resource they are lacking is motivation (N=22), followed by money (N=12) and time (N=8). The primary change that we made following the pilot study was to specifically ask participants if they believe that they could increase their access to more of the weight management resources that they need rather than simply whether they could increase their access to weight management resources as it was clear from their responses that many participants believed that they could access more resources, but that these were not the resources necessary to actually improve their ability to manage their weight.

#### Study 1: Scale Development and Initial Latent Profile Analysis

Study 1 focused on scale development of the WARM including the reliability of the subscales, the factor structure of the full scale, and analysis at the item level. The final scale was the result of an iterative scale development and item reduction procedure that included both exploratory and confirmatory factor analysis. Finally, a latent profile analysis of the WARM was conducted aimed at determining response patterns indicative of different classes of weight mindsets. Study 1 was therefore designed to test the hypotheses described below.

**Factor-structure of the WARM.** The WARM is designed to capture four weight-management related subscales: 1) whether an individual is content with their weight, 2) whether they believe that their weight is changeable, 3) whether they are content with their current access to weight management resources, and 4) whether they believe that they can increase their access to weight management resources. Therefore, a four factor model will be the best fit to the data.

### **Convergent and discriminant validity of the four subscales of the WARM.**

Evidence for convergent and discriminant validity was examined for each of the four subscales. Convergent validity is focused on the relation between a given subscale and established measures similar to the subscale, confirming that the items do in fact converge on the construct one is meaning to measure. Discriminant validity focuses on the relation between a given subscale and an established measure that allows a researcher to confirm that their measure is capturing a construct that is different from another construct.

*Convergent and discriminant validity of the content with weight subscale.* To support convergent validity, the content with weight subscale is hypothesized to be positively related to social physique anxiety (Motl & Conroy, 2000), and negatively related to body dissatisfaction (Mutale, Dunn, Stiller, & Larkin, 2016), as social physique anxiety measures the extent to which an individual experiences anxiety related to public judgment of their weight or shape, and body dissatisfaction is the difference score between the body shape one selects as their ideal body shape and the one that they select as being closest to their current shape. To support discriminant validity, the content with weight scale is hypothesized to not be significantly related to the satisfaction with life scale (Diener, Emmons, Larsen, & Griffin, 1985), a measure of global judgements of one's life satisfaction.

*Convergent and discriminant validity of the weight is changeable subscale.* To support convergent validity, the weight is changeable subscale is hypothesized to be positively related to implicit theories of weight (Burnette, 2010), as this scale measures the extent to which an individual believes that body weight is something that is

changeable. To support discriminant validity, the weight is changeable subscale is hypothesized to be unrelated to general implicit theories (Dweck, Chiu, & Hong, 1995), a measure of individuals' beliefs about whether people can change or have fixed characteristics.

***Convergent and discriminant validity of the content with weight-management resources subscale.*** To support convergent validity, the content with access to weight management resources subscale is hypothesized to be positively related to subjective socioeconomic status (Adler et al., 2000). Specifically, those with increased financial security were expected to be more likely to have access to the weight management resources that they think they need and are therefore more likely to be content with their access to weight management resources. Furthermore, feeling financially secure has been found to be more strongly related to subjective SES, whereas education and income have been found to be more strongly related to objective SES (Singh-Manoux, Adler, & Marmot, 2003). Similar to the content with weight subscale, to support discriminant validity, the weight management resources subscale is hypothesized to not be meaningfully related to general satisfaction with one's life (Diener et al., 1985).

***Convergent and discriminant validity of the can increase access to weight management resources subscale.*** Finally, to support convergent validity, whether one believes that they can increase access to weight management resources is hypothesized to be moderately positively related to both weight-control self-efficacy (Wilson et al., 2016) and generalized self-efficacy (Schwarzer & Jerusalem, 1995). This is because the weight management resources subscale measures the extent to which someone can increase their access to resources rather than just whether they think they can control their weight.



Finally, to support discriminant validity, this subscale was hypothesized to not be meaningfully related to general implicit theories (Dweck, Chiu, & Hong, 1995).

**Measurement invariance.** Measurement invariance tests whether the scale is measuring the same construct across groups, in this case gender. Measurement invariance of the final version of the WARM was done, testing specifically for differences across gender in terms of overall factor structure (i.e. configural invariance), item loadings (i.e. metric invariance), item endorsement (i.e. scalar invariance), and residual error (i.e. strict invariance). I expected that men and women might differ in terms of overall endorsement of the items as well as in their residual errors because, for example, men may be more content with their weight, on average, than women. However, configural and metric invariance which are related to whether men and women understand the items similarly were expected to be confirmed.

**Latent profile analysis (LPA).** The primary aim of LPA is to empirically identify homogeneous subclasses of individuals from seemingly heterogeneous data. An initial latent profile analysis was conducted of the final WARM. This LPA was exploratory, with the caveat that the best fitting model was expected to include more than two classes. Specifically, unlike the traditional implicit theories classifications which specify only whether weight is generally changeable or not changeable, I expected this empirical method to reveal a number of classes of individuals that differed in terms of their change beliefs about weight and access to weight management resources as well as in terms of the extent to which individuals are content with both their weight and access to weight management resources.

## Study 1 Methods

### Study Design and Participants

All hypotheses and material were preregistered on the Open Science Framework (<https://osf.io/a7rsf>). Data were collected from 624 participants who took an online survey hosted by Qualtrics Survey Software disseminated using Amazon's Mechanical Turk. To be eligible for participation, interested individuals had to be over 18 years of age, live in the United States, speak English, and have a completion rate of at least 95%, a specification that can be selected using Amazon Mechanical Turk.

**Sample size justification.** Assuming relatively high communality, 600 exceeds the size for factor analysis for four factors, with a 6 item to factor ratio (range N=55 to N=160; Mundfrom, Shaw, & Ke, 2005). It is also within the range of sample size necessary if items need to be deleted and the final scale has an item to factor ratio as low as 3 (range N=260 to N=800; Mundfrom, Shaw, & Ke, 2005).

**Procedure.** The procedure involved completing a Qualtrics survey online disseminated via Amazon Mechanical Turk.

**Measures** (see Appendix A for full set of measures)

**The Weight and Resources Mindset Questionnaire (WARM).** This measure consists of 24-items, divided equally into four subscales with six items each. The full scale, labeled as described below can be found in Appendix A. Participants rated each item from (1) strongly disagree to (6) strongly agree. The content with weight subscale (CW1\_24-CW6\_24) measures the extent to which a person is content with their weight (e.g., I feel good at my current weight). The weight is changeable subscale (WC1\_24-WC6\_24) measures the extent to which an individual believes that body weight is

changeable (e.g., “I have a certain weight, and I can’t really do much to change it”). The content with resources subscale (CR1\_24-CR6\_24) measures how content one is with their current access to weight management resources (e.g., “There is too much going on in my life to make weight management a priority”). The increase access to resources subscale (RC1\_24-RC6\_24) measures the extent to which an individual believes that they can increase their access to the weight management resources that they need to manage their weight (e.g. “No matter how hard I try, I can’t access more of the weight management resources that I need”).

**Social Physique Anxiety** (Motl & Conrow, 2000). Social physique anxiety ( $\alpha = 0.91$ ) measures the extent to which an individual experiences anxiety related to public judgment of their weight or shape. Participants rated seven items such as, “In the presence of others, I feel apprehensive about my physique or figure,” from (1) not at all characteristic of me to (6) extremely characteristic of me.

**Body Dissatisfaction** (Mutale, Dunn, Stiller, & Larkin, 2016). Participants were presented with a series of nine male and female body silhouettes ranging from very thin to very heavy. They were asked to select the body that they believe is most similar both to their current body and to their ideal body. Body dissatisfaction is the difference score between the body shape one selects as their ideal body shape and the one that they select as being closest to their current shape.

**Implicit Theories of Weight** (Burnette, 2010). Implicit theories of weight scale ( $\alpha = 0.85$ ) measures the extent to which an individual believes that body weight is something that is changeable. Participants rated six items such as, “No matter who you

are, you can significantly change your body weight, “ on a scale from (1) strongly disagree to (6) strongly agree.

**MacArthur Scale of Subjective Social Status** (Adler et al., 2000). Participants rated their subjective socioeconomic status from (1) worst off to (10) best off. They were asked to use the United States as their reference group and told that those who were the worst off were those who have the least money and education and held the least respected jobs or no job. Those who are the best off have the most money, the most education, and the most respected jobs.

**Weight Control Self-Efficacy** (Wilson et al., 2016). Weight control self-efficacy ( $\alpha = 0.95$ ) is a measure of the extent to which people believe that they can control their weight despite barriers. Participants responded to six items such as “How confident are you that you could control your weight even if you had to try several times until it works,” on a scale from 0% confident to 100% confident.

**Generalized Self-Efficacy** (Schwarzer & Jerusalem, 1995). Generalized self-efficacy ( $\alpha = 0.91$ ) measures the extent to which an individual believes that they can reach their goals despite barriers. Participants rated 10 items such as, “I can always manage to solve difficult problems if I try hard enough,” on a scale from (1) not at all true to (4) exactly true.

**Satisfaction with Life Scale** (Emmons, Larsen, Griffin, 1985). The satisfaction with life scale ( $\alpha = 0.91$ ) measures global cognitive judgements of one’s life satisfaction. Participants rated five items such as “In most ways my life is close to my ideal,” on a scale from (1) strongly disagree to (7) strongly agree.

**General Implicit Theories Scale** (Dweck, 1995). The general implicit theories scale ( $\alpha = 0.92$ ) measures the extent to which an individual believes that they type of person someone is can be changed versus remains fixed. Participants rated 3 items such as, “The kind of person someone is, is something basic about them, and it can’t be changed very much,” on a scale from (1) strongly disagree to (7) strongly agree.

**Demographics.** Participants also reported their gender, age, race/ethnicity, height, weight, and perceived weight from (1) very thin to (5) very fat.

### **Statistical Analysis**

All computations except for the latent profile analysis were performed using the statistical software package R (R Core Team, 2019).

**Reliability.** The alpha function in the psych package in R was used to determine the internal consistency of each of the four proposed subscales (content with weight, weight is changeable, content with weight management resources, can increase weight management resources) as well as the full WARM.

**Exploratory and confirmatory factor analysis.** After examining descriptive statistics, the first step of the analysis was to randomly divide the sample into two equal halves. An exploratory factor analysis (EFA) was conducted on half the sample and a confirmatory factor analysis (CFA) on the other half. EFA is a data driven approach whereas CFA is a theoretically driven approach with the ability to test specific hypotheses. Although the scale was developed based on theory, the EFA and CFA provide the most conservative test of the WARM. Model fit statistics as well as item characteristics from both the EFA and CFA were used to reduce the scale in an iterative process until the fit statistics were satisfactory.

***Exploratory factor analysis.*** The exploratory analysis was conducted with R statistical software using the *psych* package. Common factor analysis was used because the intent was to identify a latent factor structure. Specifically, I used maximum likelihood and an oblimin rotation. The maximum likelihood solution finds those communality values that minimize the chi square goodness of fit test. I chose to use maximum likelihood because researchers (Fabrigar, Wegener, MacCallum & Strahan, 1999) have argued that if the data are relatively normally distributed, maximum likelihood is the best choice because “it allows for the computation of a wide range of indexes of the goodness of fit of the model [and] permits statistical significance testing of factor loadings and correlations among factors and the computation of confidence intervals.” (p.277). They argue that principal axis factors should only be used if the assumption of multivariate normality is severely violated.

The primary goal of rotation is to simplify and clarify the structure of the data, but it cannot improve the basic aspects of analysis such as the amount of variance extracted from the items. Although conventional wisdom suggests that researchers should use orthogonal methods of rotation such as Varimax, which restrict the factors to be uncorrelated, this method makes little sense for these data since the factors are expected to be somewhat correlated. Costello and Osborne (2005) suggest that in social science research, using an oblique rotation should render more accurate and potentially produce more reproducible results given that the factors are likely to be correlated in the real world. Both parallel analysis (Horn, 1965) and the visual scree test (Cattell, 1966) were used to determine the appropriate number of factors to retain. To evaluate model fit, I used a number of indices and included the log-likelihood chi-square test, the standardized

root mean square residual (SRMR), the root mean square error of approximation (RMSEA), and the Tucker–Lewis index (TLI). I used common guidelines for adequate model fit. Specifically, RMSEA:  $\leq 0.06$ , SRMR:  $\leq 0.08$ , and CFI, TLI:  $\geq 0.9$ .

***Confirmatory factor analysis.*** I conducted a maximum likelihood confirmatory factor analysis using the lavaan package in R version 0.6-1. The latent variables were constrained to have a mean of zero and a variance of one rather than by fixing the factor loading for the first indicator to one for each latent variable. As outlined in my pre-registration, I tested a four-factor model of weight mindset. This measure of mindset was hypothesized to include four factors: content with weight, weight is changeable, content with weight management resources, and can increase access to weight management resources, which were allowed to covary with one another.

**Measurement invariance.** Four types of invariance were tested: configural invariance, metric invariance, scalar invariance, and strict invariance. Configural invariance tests whether the same items are measuring the same constructs across groups. Metric invariance is slightly stricter and is a measure of whether the factor loadings are equivalent across groups, in addition to the same items measuring the same constructs. Scalar invariance tests whether, in addition to the prior qualifications, that the item intercepts, or starting values that are the basis of the factor, are equivalent across groups. When invariance is not reached, it can be a result of bias, but may also be a result of a difference in cultural or societal norms that differentially effect the groups (e.g. cultural norms of thinness in the United States for men versus women). Finally, strict invariance further tests whether the residual error is equivalent across groups.

**Latent profile analysis (LPA).** An initial latent profile analysis (LPA) was conducted on the full sample using the final reduced WARM. LPA was used to explore the presence of distinct subgroups of individuals with differing weight mindsets, or patterns of beliefs on the four subscales of the WARM. LPA is similar to LCA but uses continuous responses in a mixture model discriminated by latent variables. In LPA, classes are created such that indicator variable are statistically independent. LPA was conducted in Mplus (Muthen & Muthen, 2017). The approach uses maximum likelihood and random starts to estimate model fit and parameters. A number of different criteria to identify the number of latent classes in LPA models have been recommended, but BIC has been shown to be the strongest indicator of the number of classes and was therefore the primary criterion for deciding on the number of latent classes (Nylund, Asparouhov, & Muthén, 2007). AIC was secondarily considered. BIC was examined across 1,000 iterations of LCA model-fitting for each of  $k=2$  to  $k=9$  classes to ensure that a global rather than a local minimum is found. The number of classes is chosen primarily based on the smallest mean BIC across iterations. However, if the percent changes in BIC are small across several models, other parameters can be examined because the solution is not useful if the classes themselves are not clear even if the BIC is the lowest. The final solution is the one that best balances model fit with clarity and theoretical usefulness.

**Missing data.** Participants who did not complete the full WARM were removed from analyses ( $n = 12$ ). The pre-registration indicated that participants who reported a BMI below 15 or above 65 were to be removed. No participants reported a BMI over 65, and examination of the data of the 9 participants whose BMI fell below 15 suggests that the low BMIs were most likely a result of a typo or misunderstanding rather than a



participant with a clinically significant low weight. Thus, the data from these participants data were included in analyses.

## **Study 1 Results**

### **Participant Characteristics**

The sample consisted of 612 individuals, 43.46% of which were men ( $n=266$ ), 54.25% of the of which were women, 0.49% reported gender non-conforming, and 1.80% did not respond. The mean age of participants was 37.05 ( $SD = 14.95$ ). A majority of the sample (68.63%) identified themselves as European/Caucasian American, 10.46% as Black/African American, 8.17% as Asian/Pacific Islander, 4.90% as Latino/Hispanic American, 5.23% indicated that they were multiracial, and 0.49% as Indian/Native American, 0.32% other, and 1.8% did not respond. The mean BMI was 27.18 ( $SD = 6.90$ ).

### **WARM24: Normality of the Subscales**

Scores for each of the four subscales of the WARM were relatively normally distributed: CW24: skew = 0.15, kurtosis = -0.61; WC24: skew = -0.41, kurtosis = -0.31; CR24: skew = 0.01, kurtosis = -0.81; RC24: skew = -0.10, kurtosis = -0.72).

### **WARM24: Item Correlations**

I computed item-level correlations for each of the four subscales. Items with a correlation over .70 were considered redundant and considered to be a candidate for removal from the scale. On the content with weight factor, the items that reached this threshold were CW1\_24 and CW3\_24 ( $r = 0.82$ ) and CW3\_24 and CW4\_24 ( $r = 0.74$ ), and CW1\_24 and CW4\_24 ( $r = 0.71$ ) marginally surpassed this threshold. On the change weight factor, no items reached this threshold. On the content with resources factor,

CR1\_24 and CR6\_24 nearly reached this threshold ( $r = 0.70$ ), and RC3\_24 and RC5\_24 marginally surpassed this threshold ( $r = .71$ ). See Table 1 for all item correlations.

Table 1. *Item correlation for each subscale of the WARM24*

WARM24 Items					
	CW1_24	CW2_24	CW3_24	CW4_24	CW5_24
CW2_24	0.68				
CW3_24	0.82	0.62			
CW4_24	0.71	0.54	0.74		
CW5_24	0.54	0.59	0.53	0.54	
CW6_24	0.5	0.62	0.53	0.53	0.68
	WC1_24	WC2_24	WC3_24	WC4_24	WC5_24
WC2_24	0.25				
WC3_24	0.44	0.42			
WC4_24	0.27	0.63	0.4		
WC5_24	0.39	0.39	0.61	0.36	
WC6_24	0.27	0.58	0.42	0.6	0.31
	CR1_24	CR2_24	CR3_24	CR4_24	CR5_24
CR2_24	0.24				
CR3_24	0.41	0.3			
CR4_24	0.44	0.29	0.53		
CR5_24	0.49	0.46	0.5	0.47	
CR6_24	0.7	0.26	0.4	0.39	0.53
	RC1_24	RC2_24	RC3_24	RC4_24	RC5_24
RC2_24	0.64				
RC3_24	0.36	0.33			
RC4_24	0.21	0.19	0.6		
RC5_24	0.37	0.33	0.71	0.52	
RC6_24	0.6	0.63	0.36	0.22	0.36

Note: CW=Content with weight, WC=weight is changeable, CR=content with resources, RC=can increase access to weight management resources

### WARM24: Reliability

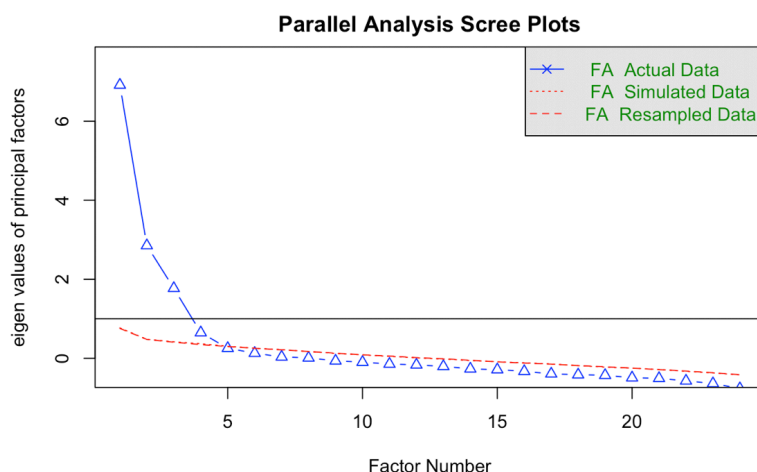
The Cronbach's alpha for each of the four factors and the full WARM indicated good reliability: CW24:  $\alpha = 0.90$  CI[0.89, 0.92]; WC24:  $\alpha = 0.81$  CI[0.79, 0.84]; CR24:  $\alpha$

= 0.82 CI[0.80, 0.84]; RC24:  $\alpha = 0.82$  CI[0.79, 0.84]; Total WARM24 scale:  $\alpha = 0.90$  CI[0.89, 0.91].

#### WARM 24: Split-Half Exploratory Factor Analysis (n = 306)

Examination of the scree plot (see Figure 2) suggested that the best solution was to retain four or five factors. The blue line shows eigenvalues of the data, the large drop and subsequent leveling off between four and five factors suggests that the four or five factor solution is the best fit to the data. The second indicator of the number of factors that is the best fit to the data is the position of the inflection point at where the difference between the two completely overlaid red lines and the blue is at its minimum. This point is also between four and five factors. Finally, parallel analysis is a statistical approach that has been shown to minimize over-identification of factors based on sampling error because this approach formally tests the probability that a factor is due to chance. Similar to the conclusions about the appropriate number of factors based on the scree plot, parallel analysis suggested retaining four factors. Therefore, I examined both four and five factor solutions using maximum likelihood and an oblimin rotation.

Figure 2. *EFA parallel analysis scree plot for WARM24*



**Four-Factor Solution.** The total variance explained by the four-factor solution was 55.8%. Examination of the communalities showed all variables except for two to have adequate communality ( $>0.40$ ; Fabrigar et al., 1999). Specifically, CW1\_24 had a communality of 0.34 and CR2\_24 had a communality of 0.31, both of which would be classified as low communality, indicating that the variable is a candidate for removal . The rotated solution showed that the first factor explained 29.67% of the variance and had an eigenvalue of 7.12, the second explained 13.87% and had an eigenvalue of 3.33, the third explained 8.71% and had an eigenvalue of 2.09, and the fourth explained 3.67% and had an eigenvalue of 0.87. The largest correlation between factors was .48, which was between the weight is changeable factor and the content with resources factor. Table 2 shows the full correlation matrix of the factors for the four-factor solution. Table 3 shows model fit statistics, which suggest that the four-factor model was a moderate fit to the data. Examination of the factor loadings revealed several items which loaded onto multiple factors (e.g., WC1\_24), and several items did not load onto the hypothesized factors (e.g., CR2\_24; see Table 4). A path diagram can be found in Appendix B.

Table 2. *Factor correlations for WARM24 four-factor solution*

	Factors		
	Factor 1	Factor 2	Factor 3
Factor 2	.10		
Factor 3	.22	.48	
Factor 4	.09	.41	0.74

Table 3. *EFA model fit statistics for WARM24*

# of Factors	RMSEA	SRMR	Tucker-Lewis	BIC
4	0.07 CI [0.06 0.08]	0.03*	0.89	-603.52
5	0.06 CI [0.05 0.07]	0.03*	0.92*	-609.73

\*indicates the statistic reaches established criteria

Table 4. *Four-factor solution factor loadings for the WARM24*

	Factor 1	Factor 2	Factor 3	Factor 4
CW1_24	0.89	-0.10	0.08	-0.07
CW2_24	0.72	0.20	-0.17	-0.07
CW3_24	0.90	-0.08	0.11	0.00
CW4_24	0.78	-0.11	0.07	0.02
CW5_24	0.64	0.16	-0.11	0.11
CW6_24	0.63	0.27	-0.19	0.17
WC1_24	0.14	-0.16	0.29	0.42
WC2_24	-0.09	0.17	-0.03	0.72
WC3_24	0.05	-0.19	0.32	0.57
WC4_24	0.07	0.14	-0.06	0.66
WC5_24	-0.10	-0.15	0.42	0.41
WC6_24	0.00	0.10	-0.07	0.69
CR1_24	0.00	0.68	0.00	0.04
CR2_24	0.15	0.20	0.40	0.07
CR3_24	0.3	0.57	0.03	-0.08
CR4_24	0.19	0.46	-0.06	0.24
CR5_24	0.09	0.57	0.14	0.22
CR6_24	-0.06	0.78	-0.01	-0.03
RC1_24	0.03	0.10	0.80	-0.01
RC2_24	0.03	0.08	0.82	-0.04
RC3_24	-0.05	0.64	0.22	0.15
RC4_24	-0.07	0.74	0.10	0.03
RC5_24	0.02	0.52	0.22	0.27
RC6_24	0.00	0.10	0.67	0.06

Note: CW=Content with weight, WC=weight is changeable, CR=content with resources, RC=can increase access to weight management resources

**Five-Factor Solution.** The total variance explained by the five-factor solution was 58.51%. Similar to the four-factor solution, examination of the communalities showed all variables except CW1\_24 (0.37) and CR2\_24 (0.33) to have communalities that reach the suggested threshold of 0.40. The rotated solution showed that the first factor explained 29.77% of the variance and had an eigenvalue of 7.15, the second explained 13.96% and had an eigenvalue of 3.35, the third explained 8.87% and had an eigenvalue of 2.13, the fourth explained 3.76% and had an eigenvalue of 0.90, and the fifth explained 2.20% and had an eigenvalue of 0.53. Similar to the four-factor solution, the largest correlation between factors was .51, which was between the weight is changeable factor and the content with resources factor. Table 5 shows the full correlation matrix of the factors for the five-factor solution. Table 3 shows model fit statistics, which suggest that the five-factor model was a moderate fit to the data. Examination of the factor loadings revealed several items which loaded onto multiple factors, and several items did not load onto the hypothesized factors (see Table 6). A path diagram can be found in Appendix C.

Table 5. *Factor correlations for WARM24 four-factor solution*

	Factors			
	Factor 1	Factor 2	Factor 3	Factor 4
Factor 2	0.18			
Factor 3	0.27	0.14		
Factor 4	0.51	0.13	0.46	
Factor 5	0.28	0.14	-0.18	0.08

Table 6. Five-factor solution factor loadings for the WARM24

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
CW1_24	0.90	-0.02	-0.10	0.03	-0.11
CW2_24	0.71	0.10	-0.03	-0.10	0.20
CW3_24	0.90	-0.01	-0.04	0.08	-0.08
CW4_24	0.78	-0.03	0.00	0.02	-0.10
CW5_24	0.62	0.02	0.17	-0.04	0.22
CW6_24	0.61	0.03	0.27	-0.07	0.36
WC1_24	0.15	-0.03	0.38	0.20	-0.31
WC2_24	-0.11	0.08	0.74	0.01	0.04
WC3_24	0.07	-0.02	0.55	0.17	-0.43
WC4_24	0.05	0.09	0.66	-0.03	0.01
WC5_24	-0.08	-0.02	0.38	0.31	-0.35
WC6_24	-0.02	0.03	0.72	-0.04	0.03
CR1_24	0.03	0.88	-0.01	-0.09	-0.17
CR2_24	0.17	0.24	0.05	0.34	-0.16
CR3_24	0.30	0.41	-0.02	0.11	0.24
CR4_24	0.18	0.34	0.29	0.00	0.15
CR5_24	0.08	0.42	0.27	0.2	0.16
CR6_24	-0.04	0.82	-0.03	-0.02	0.05
RC1_24	0.02	0.00	-0.03	0.84	0.00
RC2_24	0.02	-0.02	-0.06	0.86	-0.01
RC3_24	-0.06	0.41	0.24	0.31	0.24
RC4_24	-0.05	0.72	0.05	0.09	0.03
RC5_24	0.00	0.30	0.33	0.32	0.22
RC6_24	-0.01	-0.03	0.07	0.72	0.04

Note: CW=Content with weight, WC=weight is changeable, CR=content with resources, RC=can increase access to weight management resources

### WARM24: Split-Half Confirmatory Factor Analysis (N=306)

Given that confirmatory factor analysis is based on *a priori* theory about the factor structure, only a four-factor model that places each of the six items to their intended factor was tested. The four-factor model using all indicators was not a good fit

to the data. The chi-square test ( $\chi^2(246) = 1465.21, p = 0.00$ ) rejected the model. The RMSEA for the model was 0.13, the SRMR was 0.12, the comparative fit index was 0.73, and the Tucker-Lewis Index was 0.69. These fit statistics do not meet general recommendations for model fit (i.e. RMSEA:  $\leq 0.06$ , SRMR:  $\leq 0.08$ , and CFI, TLI:  $\geq 0.9$ ). (Hew & Bentler, 1999), suggesting that the WARM covariance structure is not well-modeled by a latent, four-factor model. However, parameter estimates indicated that all items were strong indicators of their respective factors with standardized loadings ranging from 0.43 to 0.88 (see Table 7), and the z-value of each loading reached significance. The loadings had moderate standard errors (0.06–0.1), indicating moderate precision of the factor loadings.

#### **WARM24: Item Reduction based on EFA and CFA Results**

Both an EFA and a CFA were conducted as the most conservative test of the WARM24 (see Table 8 for WARM24 items). The EFA is an empirically driven approach to testing the factor structure, whereas the CFA is a theory driven approach. Examining the model fit statistics of the four and five factor solutions of the EFA suggests that they are relatively the same in terms of model fit, with some model fit statistics suggesting the four-factor model is a better fit and others suggesting that the five-factor model is a better fit to the data. Both solutions clearly show that several items are not loading onto the expected factors or are loading onto multiple factors. Taken together with the CFA, there are several conclusions for each subscale regarding which items to retain and which items should be removed.



*Table 7. CFA four-factor solution factor loadings for WARM24*

	Loading	p-value
CW1_24	0.90	0.00
CW2_24	0.78	0.00
CW3_24	0.89	0.00
CW4_24	0.84	0.00
CW5_24	0.68	0.00
CW6_24	0.64	0.00
WC1_24	0.35	0.00
WC2_24	0.79	0.00
WC3_24	0.60	0.00
WC4_24	0.83	0.00
WC5_24	0.61	0.00
WC6_24	0.75	0.00
CR1_24	0.68	0.00
CR2_24	0.52	0.00
CR3_24	0.69	0.00
CR4_24	0.67	0.00
CR5_24	0.76	0.00
CR6_24	0.68	0.00
RC1_24	0.45	0.00
RC2_24	0.43	0.00
RC3_24	0.85	0.00
RC4_24	0.70	0.00
RC5_24	0.80	0.00
RC6_24	0.50	0.00

Note: CW=Content with weight, WC=weight is changeable, CR=content with resources, RC=can increase access to weight management resources

Table 8. *WARM24 items*

Item	Item Wording
CW1_24	I am content with my current weight.
CW2_24	I want to change my current weight.*
CW3_24	I feel good at my current weight.
CW4_24	I am content with how others view my current weight.
CW5_24	My current weight keeps me from feeling confident in the clothing I want to wear.*
CW6_24	My current weight makes me uncomfortable in social situations.*
WC1_24	My weight is determined by factors I can control.
WC2_24	I have a certain weight, and I can't really do much to change it.*
WC3_24	My weight is determined by my choices and behaviors.
WC4_24	Regardless of what I do, I can't control my weight.*
WC5_24	I know if I chose to change my behavior, I could change my weight.
WC6_24	My weight is not something I can control.*
CR1_24	There is too much going on in my life to make weight management a priority*.
CR2_24	I have access to all to the weight management information I need.
CR3_24	I wish I had more money to devote to weight management.*
CR4_24	I wish that I had more people supporting me in my weight management efforts.*
CR5_24	In general, I don't have what I need to manage my weight.*
CR6_24	I don't have the time to manage my weight.*
RC1_24	I could get access to more of the weight management resources that I need.
RC2_24	I could find a way to increase my access to the weight management resources that I need.
RC3_24	There are too many barriers to getting access to more of the weight management resources that I need.*
RC4_24	I have too much going on in my life to access more of the weight management resources that I need.*
RC5_24	No matter how hard I try, I can't access more of the weight management resources that I need.*
RC6_24	If I put my mind to it, I could increase my access to the weight management resources that I need.

\*indicates reverse scored items

**WARM24: content with weight item reduction.** Across all models, the content with weight factor is relatively stable. However, CW1\_24 and CW3\_24 were highly correlated ( $r = 0.82$ ) as were CW3\_24 and CW4\_24 ( $r = 0.74$ ), and CW1\_24 and CW4\_24 ( $r = 0.71$ ). This suggests that one of each pair of these items should potentially be candidates for removal. CW1\_24 (“I am content with my current weight.”) was removed because of its relatively low communality and high correlation with CW3\_24 (“I feel good at my current weight.”). CW3\_24 and CW4\_24 (“I am content with how others view my current weight.”) were both considered as candidates for removal because of their high correlation. The decision was made to remove CW3\_24 because it lacked clarity in terms of specific meaning and its relation to being content with one’s weight. Therefore, CW2\_24, CW4\_24, CW5\_24, and CW6\_24 were retained as they all had relatively high loadings on the target factor in the four-factor solutions, and none have loadings over 0.3 on an alternative factor nor alternative factor loadings within 0.2 of the loading on the target factor.

**WARM 24: weight is changeable item reduction.** Although WC1\_24 (“My weight is determined by factors I can control.”), WC3\_24 (“My weight is determined by my choices and behaviors.”), and WC5\_24 (“I know if I chose to change my behavior, I could change my weight.”) each loaded at least 0.4 onto the target factor in the EFA, they all have cross loadings that are either over 0.3 or within 0.2 of the loading on the target factor, suggesting these items as candidates for removal. These items also load onto the can increase weight management resources factor in both solutions. In addition, they have the three lowest loadings on the target factor. WC2\_24, WC4\_24, and WC6\_24 all had relatively high loadings on the target factor in both the four-factor EFA and CFA. These

were the three items worded such that participants were agreeing that weight is fixed rather than that it is changeable. The observation that these emerged as the best items is consistent with evidence from the implicit theories literature which similarly observed it was sufficient to only use the fixed-mindset worded items (Dweck, 1995).

**WARM24: content with weight management resources item reduction.** In the EFA four-factor solution, CR2\_24 (“I have access to all to the weight management information I need.”) had a factor loading on an alternative factor that is greater than its loading on the intended factor, and CR3\_24 (“I wish I had more money to devote to weight management.”) had a cross-loading greater than 0.3 on an alternative factor, suggesting these items as candidates for removal. CR1\_24, CR4\_24, CR5\_24, and CR6\_24 all had adequate factor loadings in the EFA and CFA on the target factor.

**WARM24: can increase weight management resources item reduction.** RC3\_24 (“There are too many barriers to getting access to more of the weight management resources that I need.”), RC4\_24 (“I have too much going on in my life to access more of the weight management resources that I need.”), and RC5\_24 (“No matter how hard I try, I can’t access more of the weight management resources that I need.”) all load more strongly onto the content with weight management resources factor than onto the target factor, suggesting these items as candidates for removal. RC1\_24, RC2\_24, and RC6\_24 have adequate loadings onto the target factor in the EFA and CFA. Of note, these are the three positively worded items on this factor in that they were worded such that participants were agreeing that they could increase their access to weight management resources rather than that they could not increase their access.

### **WARM24 Item Reduction to WARM14**

As described, the WARM14 was a first modification based on the results of the WARM24 EFA and the CFA. The next step was to repeat the split half EFA and CFA using the WARM14 and reexamine model fit. The focus was on improving the fit of the four-factor model and on increasing the parsimony of the scale. For the content with weight factor, CW2\_24, CW4\_24, CW5\_24, and CW6\_24 were retained. These items all had adequate communalities, were not so correlated with one another as to suggest redundancy, and each of them loaded onto the intended factor and had only weak cross-loadings. They were also the negatively worded items, meaning that participants are rating the extent to which they agree or disagree with items such as “My current weight keeps me from feeling confident in the clothing I want to wear.” For the weight is changeable factor, WC2\_24, WC4\_24, and WC6\_24 were retained. These items had the highest communalities, highest factor loadings and moderate intercorrelations. As noted, these items ask participants the extent to which they agree or disagree that weight is fixed. For content with resources factor, CR1\_24 and CR6\_24 were retained because they had the strongest loadings on the intended factor and very weak cross-loadings. In addition, CR4\_24 and CR5\_24 were retained because they had the lowest loadings on alternative factors, and each had a loading on the target factor greater than 0.40. CR1\_24, CR5\_24, and CR6\_24 also have the highest communalities. Finally, for the can increase access to weight management resources factor, CR1\_24, CR2\_24, and CR6\_24 were retained. These three items had the three strongest loadings onto the target factor in the EFA, but in the CFA, the loadings were lower. However, in that model, the CR and RC factors were correlated at .88, suggesting that CR2\_24, CR3\_24, and CR4\_24 may have

been more of a highly correlated factor redundant with the content with resources factor rather than a factor indicative of the intended latent construct. See Table 9 for a full list of the items in the WARM14.

Table 9. *WARM14 items*

Item	Item Wording
CW2_14	I want to change my current weight.*
CW4_14	I am content with how others view my current weight.
CW5_14	My current weight keeps me from feeling confident in the clothing I want to wear.*
CW6_14	My current weight makes me uncomfortable in social situations.*
WC2_14	I have a certain weight, and I can't really do much to change it.*
WC4_14	Regardless of what I do, I can't control my weight.*
WC6_14	My weight is not something I can control.*
RC1_14	There is too much going on in my life to make weight management a priority*.
RC4_14	I wish that I had more people supporting me in my weight management efforts.*
RC5_14	In general, I don't have what I need to manage my weight.*
RC6_14	I don't have the time to manage my weight.*
CR1_14	I could get access to more of the weight management resources that I need.
CR2_14	I could find a way to increase my access to the weight management resources that I need.
CR6_14	If I put my mind to it, I could increase my access to the weight management resources that I need.

#### **WARM14: Normality of the subscales**

Scores for the CW14 and RC14 factors were relatively normally distributed:

CW14: skew = 0.21, kurtosis = -0.69; RC14: skew = -0.16, kurtosis = -0.72. For WC14 and CR14 the kurtosis suggests normality, but both were skewed left: WC14: skew = -6.97, kurtosis = -0.21; CR14: skew = -5.77, kurtosis = -0.42.

### WARM14: Item Correlations

All of the item-level correlations for each of the four factors of the WARM14 fell below the recommended threshold of 0.70 (see Table 10).

Table 10. *Factor correlation for the four-factor solution of the WARM14*

WARM14 Items			
	CW2_14	CW4_14	CW5_14
CW4_14	0.54		
CW5_14	0.59	0.54	
CW6_14	0.62	0.53	0.68
	WC2_14	WC4_14	
WC4_14	0.63		
WC6_14	0.58	0.6	
	CR1_14	CR4_14	CR5_14
CR4_14	0.44		
CR5_14	0.49	0.47	
CR6_14	0.7	0.39	0.53
	RC1_14	RC2_14	RC6_14
RC2_14	0.64		
RC6_14	0.6	0.63	

Note: CW=Content with weight, WC=weight is changeable, CR=content with resources, RC=can increase access to weight management resources

### WARM14: Reliability

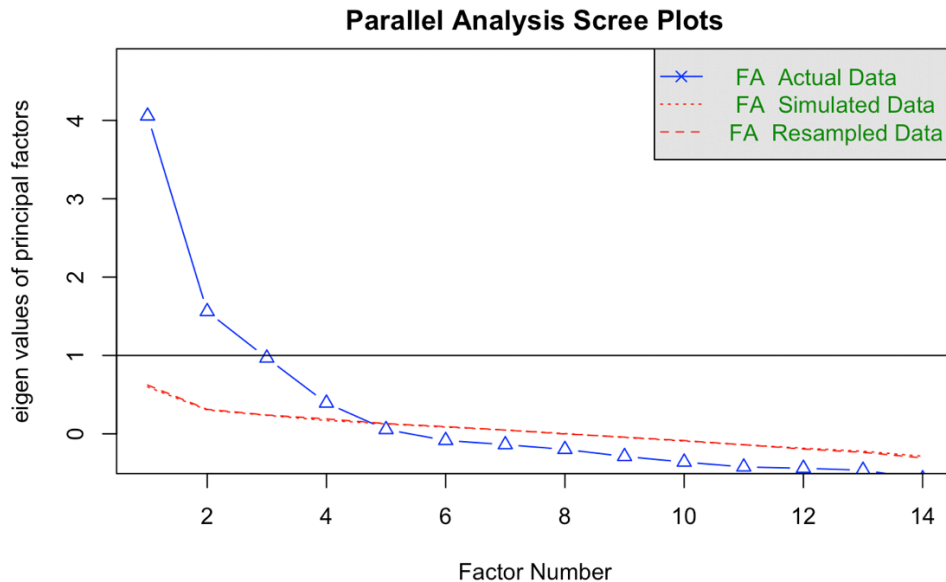
The Cronbach's alpha for each of the four subscales and the full WARM indicated good reliability: CW14:  $\alpha = 0.85$  CI[0.83, 0.87]; WC14:  $\alpha = 0.82$  CI[0.80, 0.85]; CR14:  $\alpha = 0.80$  CI[0.77, 0.83]; RC14:  $\alpha = 0.70$  CI[0.66, 0.87]; WARM14 scale:  $\alpha = 0.82$  CI[0.80, 0.84].

### WARM14: Split-half Exploratory Factor Analysis (N = 306)

Examination of the scree plot (see Figure 3) suggested that the best solution was to retain four or five factors. The blue line shows eigenvalues of the data; the large drop and subsequent leveling off between four and five factors suggests that the four or five

factor solution is the best fit to the data. In addition, the inflection point, where the difference between the two overlaid red lines, and actual data is at its minimum, is again between four and five factors. Finally, parallel analysis suggested retaining four factors. Given the *a priori* theory that the scale should be comprised of four factors and the results of the WARM24 five-factor EFA, which gave little insight beyond the results of the four-factor solution, I examined only the four-factor solution overall fit and item-level statistics.

Figure 3. *EFA parallel analysis scree plot for WARM14*



**Four-factor solution.** The total variance explained by the four-factor solution was 60.20%. Examination of the communalities showed all variables except CR4\_14 (0.38) to have communalities greater than 0.40. The rotated solution showed that the first factor explained 30.88% of the variance and had an eigenvalue of 4.32, the second explained 14.00% and had an eigenvalue of 1.97, the third explained 10.01% and had an eigenvalue of 1.40, and the fourth explained 5.24% and had an eigenvalue of 0.73. The



largest correlation between factors was .48, which was again between the weight is changeable factor and the content with resources factor. Table 11 shows the full correlation matrix of the factors for the four-factor solution. Table 12 shows model fit statistics, which suggest that the four-factor model was a relatively good fit to the data. Examination of the factor loadings revealed that all items except for CR4\_14 load most strongly onto the target factor (see Table 13). In addition, CR5\_14 has a loading of 0.35 onto the target factor, content with resources, as well as a loading of 0.34 onto the weight is changeable factor. CR6\_14 also presents as a Heywood case, an item that loads in excess of 1.00 on a factor. Specifically, it loads 1.02 onto the target factor, however, this can happen when using an oblique rotation in maximum likelihood and in smaller sample sizes (see Costello & Osborne, 2005; MacCallum, Widaman, Zhang, & Hong, 1999), and the factor score in the unrotated solution (0.997) does not exceed 1.00. A path diagram can be found in Appendix D.

Table 11. *Factor correlation for the WARM14 four-factor solution*

	Factors		
	CW14	WC14	CR14
WC14	.26		
CR14	.26	.48	
RC14	.10	.36	0.74

Table 12. *EFA model fit statistics for WARM14*

# of Factors	RMSEA	SRMR	Tucker-Lewis	BIC
4	0.05 CI [0.02 0.06]*	0.02*	0.97*	-170.45

\*indicates the statistic reaches established criteria

Table 13. *Four-factor solution factor loadings for the WARM14*

	Factor 1	Factor 2	Factor 3	Factor 4
CW2_14	0.74	-0.11	-0.07	0.08
CW4_14	0.70	-0.14	0.14	-0.13
CW5_14	0.77	0.04	0.01	-0.03
CW6_14	0.80	0.14	-0.06	0.05
WC2_14	-0.06	0.83	0.02	-0.01
WC4_14	0.05	0.67	0.03	0.06
WC6_14	0.02	0.73	0.01	-0.04
CR1_14	0.06	0.14	0.01	0.60
CR4_14	0.28	0.36	0.00	0.18
CR5_14	0.19	0.33	0.17	0.35
CR6_14	-0.02	-0.04	0.01	1.02
RC1_14	0.00	0.03	0.80	0.00
RC2_14	-0.02	-0.04	0.90	0.02
RC6_14	0.01	0.09	0.68	-0.01

**WARM14: Split-half Confirmatory Factor Analysis (N = 306)**

The indicators suggested that the four-factor model was a relatively good fit to the data. The chi-square test ( $X^2(48) = 224.21$   $p = 0.00$ ) rejected the model. The RMSEA for the model was 0.08 CI[0.07 0.10], the SRMR was 0.07, the comparative fit index was 0.92, and the Tucker-Lewis Index was 0.90. These fit statistics meet or marginally meet general recommendations for model fit, (i.e. RMSEA:  $\leq 0.06$ , SRMR:  $\leq 0.08$ , and CFI, TLI:  $\geq 0.9$ ) suggesting that the WARM14 covariance structure is relatively well-modeled by a latent, four-factor model. In addition, parameter estimates indicated that all items were strong indicators of their respective factors with standardized loadings ranging from 0.60 to 0.87 (see Table 14), and the z-value of each loading reached significance.

Table 14. *CFA four-factor solution factor loadings for WARM14*

	Loading	p-value
CW2_14	0.77	0.00
CW4_14	0.70	0.00
CW5_14	0.83	0.00
CW6_14	0.83	0.00
WC2_14	0.79	0.00
WC4_14	0.87	0.00
WC6_14	0.76	0.00
CR1_14	0.78	0.00
CR4_14	0.60	0.00
CR5_14	0.71	0.00
CR6_14	0.77	0.00
RC1_14	0.75	0.00
RC2_14	0.75	0.00
RC6_14	0.84	0.00

### **WARM14 Factor Analysis Summary and Final Reduction to WARM12**

Based on the results of the WARM14 exploratory and confirmatory factor analyses, the WARM14 was further reduced to a 12-item scale (WARM12). The WARM12 is the result of a modification process based on the results of both the WARM14 EFA and the CFA and on theory. The focus was on improving the fit of the four-factor model and further increasing the parsimony of the scale. The scale was reduced to have 3-items per factor. This meant, for the content with weight factor, CW2\_14, CW5\_14, and CW6\_14 were retained as these items had high loadings on this factor. These items all had adequate communalities, were not so correlated with one another as to suggest redundancy, and each loaded onto the intended factor and had only weak cross-loadings. They were also the negatively worded items, meaning that

participants are rating the extent to which they agree or disagree with items such as “My current weight keeps me from feeling confident in the clothing I want to wear.” CW4\_14 (“I am content with how others view my current weight.”) was removed because it was ultimately decided that the factor should measure how content one is with their own weight rather than include assessment of how they perceive others to view their weight. For the weight is changeable factor, WC2\_14, WC4\_14, and WC6\_14 were retained. For content with resources factor, CR4\_14 (“I wish that I had more people supporting me in my weight management efforts.”) was removed because of its high cross loading. CR1\_14 and CR6\_14 were retained because they had the strongest loadings on the intended factor and very weak cross-loadings. CR5\_14 was also retained because the difference between its loading on the target factor and its cross-loading was larger than that of CR3\_14 or CR4\_14. CR1\_14, CR5\_14, and CR6\_14 also have the highest communalities. Finally, for the can increase access to weight management resources factor, RC1\_14, RC2\_14, and RC6\_14 were retained. See Table 15 for the items in the WARM12. Given that the scale was reduced to 12-items and further reductions were not possible, all further analyses were conducted on the full sample.

Table 15. *WARM12 items*

Item	Item Wording
CW2_12	I want to change my current weight.*
CW5_12	My current weight keeps me from feeling confident in the clothing I want to wear.*
CW6_12	My current weight makes me uncomfortable in social situations.*
WC2_12	I have a certain weight, and I can't really do much to change it.*
WC4_12	Regardless of what I do, I can't control my weight.*
WC6_12	My weight is not something I can control.*
RC1_12	There is too much going on in my life to make weight management a priority*.
RC5_12	In general, I don't have what I need to manage my weight.*
RC6_12	I don't have the time to manage my weight.*
CR1_12	I could get access to more of the weight management resources that I need.
CR2_12	I could find a way to increase my access to the weight management resources that I need.
CR6_12	If I put my mind to it, I could increase my access to the weight management resources that I need.

\*indicates reverse-scored item

### **WARM12: Normality of the subscales**

Scores for the CW12 and RC12 factors were relatively normally distributed:

CW12: skew = 0.29, kurtosis = -0.85; RC12: skew = -0.26, kurtosis = -0.77. For WC12

and CR12 the kurtosis suggests normality, but both are skewed left: WC12: skew = -6.97,

kurtosis = -0.21; CR12: skew = -5.77, kurtosis = -0.42.

### WARM12: Item Correlations

Item-level correlations were computed for each of the four factors of the WARM12. All of the correlations fell below the recommended threshold of 0.70 (see Table 16).

Table 16. *Item correlations for each subscale of the WARM12*

WARM12 Items		
	CW2_12	CW5_12
CW5_12	0.58	
CW6_12	0.62	0.68
	WC2_12	WC4_12
WC4_12	0.63	
WC6_12	0.58	0.60
	CR1_12	CR5_12
CR5_12	0.49	
CR6_12	0.70	0.52
	RC1_12	RC2_12
RC2_12	0.64	
RC6_12	0.60	0.63

### WARM12: Reliability

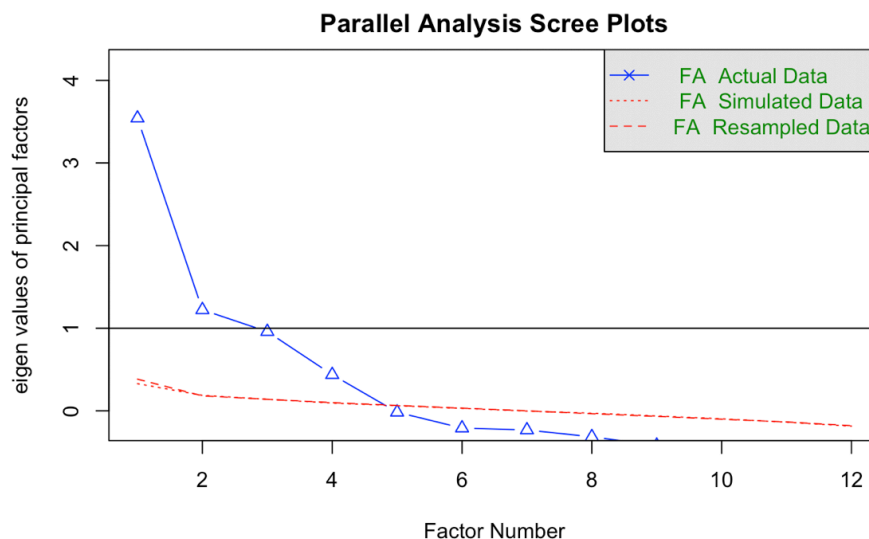
The Cronbach's alpha for each of the four subscales and the full WARM12 scale indicated good reliability: CW12:  $\alpha = 0.84$  CI[0.81, 0.86]; WC12:  $\alpha = 0.82$  CI[0.80, 0.85]; CR12:  $\alpha = 0.80$  CI[0.77, 0.83]; RC12:  $\alpha = 0.70$  CI[0.66, 0.87]; WARM12 scale:  $\alpha = 0.82$  CI[0.80, 0.84].

### WARM12: Exploratory Factor Analysis (N=612)

Examination of the scree plot (see Figure 4) suggested that the best solution was to retain four or five factors. The blue line shows eigenvalues of the data, the large drop and subsequent leveling off between four and five factors suggests that the four or five

factor solution is the best fit to the data. In addition, the inflection point, where the two overlaid red lines, and actual data is at its minimum, is also between four and five factors. Finally, parallel analysis suggested retaining four factors.

Figure 4. *EFA parallel analysis scree plot for WARM12*



**Four-factor solution.** The total variance explained by the four-factor solution was 63.03%. Examination of the communalities showed all variables to have adequate communality. The rotated solution showed that the first factor explained 31.91% of the variance and had an eigenvalue of 3.83, the second explained 13.93% and had an eigenvalue of 1.67, the third explained 11.16% and had an eigenvalue of 1.34, and the fourth explained 6.03% and had an eigenvalue of 0.72. The largest correlation between factors was .54, which was again between the weight is changeable factor and the content with resources factor. Table 17 shows the full correlation matrix of the factors for the four-factor solution. Table 18 shows model fit statistics, which suggest that the four-factor model was a relatively good fit to the data. Examination of the factor loadings revealed that all items load most strongly onto the target factor (see Table 19). One item,

CR5 has a loading of 0.37 onto the content with resources factor as well as a loading of 0.26 onto the weight is changeable factor. Although it is preferred that the difference between the loading on the target and alternative factor is greater than 0.20, given the fact that these two factors were expected to be correlated *a priori*, it was determined that CR5\_12 could be retained. A path diagram can be found in Appendix E.

Table 17. *Factor correlation for the WARM12 four-factor solution*

Factors			
	Factor 1	Factor 2	Factor 3
Factor 2	.14		
Factor 3	.26	.30	
Factor 4	.35	.25	0.54

Table 18. *EFA Model fit statistics for WARM12*

# of Factors	RMSEA	SRMR	Tucker-Lewis	BIC
4	0.04 CI [0.02 0.06]*	0.01*	0.98*	-112.17

\*indicates the statistic reaches established criteria

Table 19. *Four-factor solution factor loadings for the WARM12*

	Factor 1	Factor 2	Factor 3	Factor 4
CW2_12	0.76	-0.05	-0.10	0.01
CW5_12	0.80	0.06	-0.03	-0.02
CW6_12	0.83	-0.01	0.11	0.01
WC2_12	-0.08	0.04	0.78	0.04
WC4_12	0.06	-0.01	0.80	-0.01
WC6_12	0.02	-0.03	0.76	0.02
CR1_12	0.00	-0.02	0.00	0.81
CR5_12	0.18	0.17	0.26	0.37
CR6_12	-0.01	0.00	-0.01	0.87
RC1_12	0.01	0.78	0.00	0.00
RC2_12	0.01	0.83	-0.02	-0.03
RC6_12	-0.03	0.77	-0.01	0.03



### WARM12: Confirmatory Factor Analysis (N = 612)

The four-factor model using the indicators was a good fit to the data. The chi-square test ( $X^2(48) = 198.92$ ,  $p = 0.00$ ) rejected the model. The RMSEA for the model was 0.07, the SRMR was 0.06, the comparative fit index was 0.95, and the Tucker-Lewis Index was 0.94. These fit statistics meet or marginally meet general recommendations for model fit, (i.e. RMSEA:  $\leq 0.06$ , SRMR:  $\leq 0.08$ , and CFI, TLI:  $\geq 0.9$ ) suggesting that the WARM12 covariance structure is well-modeled by a latent, four-factor model. In addition, parameter estimates indicated that all items were strong indicators of their respective factors with standardized loadings ranging from 0.68 to 0.88 (see Table 20), and the z-value of each loading reached significance. A path diagram can be found in Appendix F.

Table 20. *CFA four-factor solution factor loadings for WARM12*

	Loading	p-value
CW2_12	0.71	0.00
CW5_12	0.79	0.00
CW6_12	0.88	0.00
WC2_12	0.79	0.00
WC4_12	0.81	0.00
WC6_12	0.74	0.00
CR1_12	0.79	0.00
CR5_12	0.68	0.00
CR6_12	0.83	0.00
RC1_12	0.78	0.00
RC2_12	0.81	0.00
RC6_12	0.78	0.00

### **WARM12: Convergent and Discriminant Validity of the Four Subscales**

To test the convergent and discriminate validity of the WARM12, each of the four subscales was correlated with a specific set of self-report measures. Overall, the correlations were consistent with hypotheses. Specifically, the content with weight subscale was negatively related to both social physique anxiety ( $r = -0.72, p < 0.001$ ) and body satisfaction ( $r = -0.44, p < 0.001$ ), and only moderately positively related to life satisfaction ( $r = 0.22, p < .01$ ). This pattern of correlations indicated that being more content with one's weight was related to decreased social physique anxiety, decreased discrepancy between one's current body shape and one's ideal body shape, and moderately positively related to overall life satisfaction. As expected, the weight is changeable subscale was positively related to implicit theories of weight ( $r = 0.68, p < 0.001$ ) and only moderately related to general implicit theories ( $r = 0.40, p < 0.001$ ). As hypothesized, the content with resources subscale was weakly related to life satisfaction ( $r = 0.14, p < 0.001$ ). Although this subscale was expected to be positively related to SES, the relation was not statistically significant ( $r = 0.03, p = .54$ ). Finally, as hypothesized, the increase weight management resources subscale was moderately positively related to both weight control self-efficacy ( $r = 0.34, p < .001$ ) and to general self-efficacy ( $r = 0.37, p < 0.001$ ), and not significantly related to general implicit theories ( $r = 0.11, p = 0.10$ ).

### **Measurement Invariance**

Measurement invariance was examined across gender. Configural and metric invariance were both found, suggesting that the items are measuring the same constructs across groups and that the factor loadings are equivalent across groups. Neither scalar and

strict invariance were found suggesting that neither the intercepts nor the residual error are equivalent across groups (see Table 21 for model fit statistics). However, neither scalar nor strict measurement invariance was expected as men and women were thought to differ in their scores on these weight related variables.

Table 21. *Measurement invariance of the WARM12*

Invariance Type	Df	AIC	BIC	Chisq	Chisq diff	Df diff	Pr (>Chisq)
Configural	96.00	22349.00	22718.00	254.95			
Metric	104.00	22339.00	22673.00	260.77	5.82	8.00	0.66
Scalar	112.00	22361.00	22659.00	298.33	37.56	8.00	0.00
Strict	116.00	22382.00	22663.00	327.58	29.25	4.00	0.00

### Initial Latent Profile Analysis

The LPA analysis revealed the 6-class, 7-class, and 8-class solutions to all be relatively good fits to the data (see Table 22 for model fit statistics). Table 23 shows the number of individuals assigned to each class for the 6-class, 7-class, and 8-class models. As noted, the number of classes is chosen primarily based on the smallest BIC. However, if the percent changes in BIC are small across several models, other parameters can be examined because the solution is not useful if the classes themselves are not clear even if the BIC is the lowest. The AIC is secondarily considered, with lower AIC indicating better fit. Finally, higher entropy indicates better fit. The final solution is the one that best balances model fit with clarity and theoretical usefulness. Although the 9-class model had good overall fit, examination of item-level indicators revealed that the 9-class model was oversaturated. The average class probabilities were all relatively high for the 6-class

model, (86.6%-95.0%), 7-class model (87.1% - 96.3%), and 8-class model (86.1%-98.1%).

*Table 22. Model fit statistics for LPA of the WARM12*

Classes	BIC	% change BIC	AIC	Adjusted BIC	% change Adjusted BIC	Entropy	% change Entropy
2	23905.75		23743.69	23788.29		0.827	
3	23344.125	2.35%	231245.12	23185.39	2.53%	0.873	-5.56%
4	23131.02	0.91%	22855.08	22931.02	1.10%	0.851	2.52%
5	22966.59	0.71%	22633.7	22725.32	0.90%	0.861	-1.18%
6	22839.76	0.55%	22449.93	22557.23	0.74%	0.857	0.46%
7	22726.72	0.49%	22279.95	22402.9	0.68%	0.865	-0.93%
8	22662.97	0.28%	22159.26	22297.89	0.47%	0.876	-1.27%
9	22615.24	0.21%	22054.58	22208.88	0.40%	0.884	-0.91%

*Table 23. Distribution of individuals for the 6, 7, and, 8-class models*

	Class 1	Class 2	Class 3	Class 4	Class 5	Class 6	Class 7	Class 8
6-Class	22	113	130	135	109	81		
7-Class	45	131	110	92	117	17	78	
8-Class	42	120	87	113	17	111	78	22

## Study 1 Discussion

The primary goal of Study 1 was to test the factor structure of the WARM using the most rigorous and conservative scale development practices. The field of weight management research has been in need of a comprehensive and well-validated measure of weight mindset. Previous measures of weight mindset have not been developed or validated using best practices and were based loosely on implicit theories research in other domains (Burnette, 2010) without significant regard for differences that might be unique to the study of mindset in the domain of weight management. Study 1 presents

the development and validation of the WARM12, a self-report four-factor measure of weight mindset. Results from the EFA and CFA were consistent with the hypothesized four-factor model of weight mindset. The four subscales of the WARM12 were chosen because past literature suggests that measuring only whether individuals believe weight is changeable or not changeable was not consistently predictive of important health outcomes nor of weight management outcomes (e.g. Auster-Gussman & Rothman, 2018). Research from other domains indicated the potential need for a distinction between those who are and are not content with their current ability or position in a given domain (Ommundsen, 2001). It is clear from the results that whether one is or is not content with their weight is distinct from whether one believes weight is changeable or not changeable. Study 1 led to the successful creation of a parsimonious, empirically and theoretically derived four-factor measure of weight mindset that can be used in future research. Its use may also help researchers clarify disparate findings in the literature, such as why the belief that weight is changeable is not universally beneficial (e.g. Burnette & Finkel, 2012).

The tests of convergent and discriminant validity indicate that the subscales do indeed measure the constructs that we intended them to capture and primarily yielded results in line with hypotheses. The findings that did not align with hypotheses should not be interpreted with alarm. Specifically, the content with weight subscale was hypothesized to be unrelated to life satisfaction. Although they were related ( $r = 0.22$ ) it is clear that they are not redundant variables, and the modest magnitude of this correlation is unsurprising given that one's body weight may play some role in their overall life satisfaction. Similarly, general implicit theories was hypothesized not to be

significantly related to the weight is changeable subscale. Although they were related ( $r = 0.33$ ), the correlation was much lower than that of implicit theories of weight ( $r = 0.68$ ) and does not suggest that this subscale represents a general sense that characteristics are changeable as opposed to the idea that weight is changeable. The content with resources subscale was hypothesized to be unrelated to life satisfaction. Although it was related, the relation was quite weak ( $r = 0.14$ ). Unexpectedly, the content with resources subscale was not significantly related to subjective socioeconomic status ( $r = 0.03$ ). However, it is possible that as one's subjective socioeconomic status (SES) increases, their expectations for the types and amount of access to weight management resources that they have access to shifts. For example, a low SES individual might be thinking about whether they have access to fresh vegetables or to a safe place to exercise, whereas a high SES individual may be thinking about whether they have access to a personal trainer or to the special supplements they need in order to manage their weight. If this is the case, then one would not necessarily expect SES to be related to whether one is content with weight management resources.

The WARM was designed not only to be used on its own as a measure of each of the four constructs, but more specifically as a tool for generating a new set of weight mindset classes beyond the two classes that can be distinguished using current measure of implicit theories of weight (e.g. Burnette, 2010). The use of latent profile analysis is different than classical weight mindset classification that simply use mean scores on a single construct to classify individuals, namely, the extent to which they believe weight is changeable. Researchers have not previously attempted to empirically derive classes of weight mindset using tools such as LPA. Unlike traditional approaches, LPA provides a

way to identify a set of underlying subgroups characterized multiple dimensions and complex response patterns. This allows for insights not possible with traditional classification approaches. Furthermore, because this sample was recruited on Amazon's Mechanical Turk to increase diversity beyond a college sample, the WARM has the potential to be used on a relatively broad array of populations. This initial LPA provided evidence that individuals hold varying levels of these four beliefs that can be categorized into far more than the two classes (entity, incremental) that are identified using traditional measures of weight mindset (e.g. Burnette, 2010).

### **Limitations**

Study 1 had several limitations. First, these items were written specifically to tap these four dimensions of weight mindset because past research (e.g. Ommundsen, 2001) suggests that these four dimensions are most important for the prediction of health and health behavior. However, item writing is a difficult process and items can always be improved to be clearer. Although we expected the four subscales of the WARM12 and therefore the items of the WARM to be related to one another, we did not necessarily predict the high relation between the weight is changeable factor and the content with resources factor. However, this relation may not be an artifact of wording. There are reasons to believe that the extent to which one believes weight is changeable is related to how content one is with their access to weight management resources. Specifically, being highly content with access to weight management resources may make weight management seem more possible, and not being content with one's resources may make weight management seem implausibly difficult. Second, CR5 had a cross-loading of 0.26 onto the weight is changeable factor, and as noted, it is preferred that the difference

between the loading on the target and alternative factor is greater than 0.20. Finally, the RMSEA for the model was 0.07, which does not meet the recommended criteria of 0.06. However, the SRMR, comparative fit index, and the Tucker-Lewis Index all met recommended model fit criteria.

In conclusion, Study 1 resulted in the creation of the WARM12, which will be referred to as the WARM going forward, a new four-factor measure of weight mindset that *1) distinguishes between a person's belief that their weight is changeable and the belief that their access to weight management resources is changeable, and 2) differentiates between their contentment with their current weight and contentment with their current access to weight management resources*. The results of a subsequent latent profile analysis (LPA) suggest that there are approximately six to eight distinct weight mindset classes made up of individuals with varying combinations of levels of beliefs on each of the four subscales of the WARM. With the development of a scale in hand, the next steps are aimed at understanding how these mindsets are related to outcomes. These outcomes include engagement in health behavior, individual's relationship with eating, weight stigma, and self-stigma. The current literature needs clarification in terms of which combinations of weight related beliefs are related to these outcomes, and current measures of weight mindset are not sufficient to accomplish this need.

#### Study 2: Latent Profile Analysis and Descriptions for the WARM

Study 2 is part one of an explanatory sequential design (see Creswell & Plano-Clark, 2007), a design in which one first gathers quantitative data to understand a phenomenon and then gathers qualitative data from a sub-sample of the participants to more richly understand a specific aspect of that phenomenon. In this case, Study 2 was a



quantitative study focused on both establishing the number of weight mindsets empirically using LPA as well as using these weight mindset classes as a predictor of differences in other weight-management related variables. LPA was used as an empirical means by which to examine differences in response patterns across individuals whereby individuals with similar response patterns are classified together. LPA allowed for the examination of the number of different response patterns that best characterizes the data, in this case, weight mindsets. The purpose of Study 2 was to understand differences across weight mindset classes in terms of health behavior, health behavior motivation, perceptions of one's physical and social environments, weight stigma, weight beliefs, sociodemographic variables, body weight, and dieting history. These patterns of self-report beliefs and behaviors were then synthesized to create profiles of each of the mindset classes. These classes result from an individual's given constellation of weight related beliefs rather than merely by examining one's beliefs about weight changeability.

The best fitting LPA model was hypothesized to be a six, seven, or eight class model, replicating the results from Study 1. After determining the final weight mindset classes, the classes were used to examine differences across the weight-management related variables as outlined in my pre-registration ([osf.io/57agv](https://osf.io/57agv)). Given that the number of classes or the exact patterns of endorsement of each of the four subscales of the WARM was not known *a priori*, specific hypotheses regarding dependent variables were framed in terms of expected differences between classes, and these differences were described in terms of the level of endorsement of certain combinations of subscales. Individuals categorized as "high" for a given subscale had a mean endorsement of that subscale that fell into the top third (i.e. 4.32 to 6) and individuals categorized as being

“low” for a given subscale had a mean endorsement that fell into the bottom third (i.e. 1-2.66). An example hypothesis is that individuals in classes characterized by being “high” in content with weight and “high” in being content with access to weight management resources report higher levels of exercise than individuals in other mindset classes. My specific hypotheses were as follows.

### **Health Behaviors**

**Exercise.** Individuals in mindset classes characterized by being “high” in both 1) content with weight and 2) content with weight-management resources will report higher levels of exercise than individuals in all of the other mindset classes.

**Fruit and vegetable consumption.** Individuals in mindset classes characterized by being “high” in both 1) content with weight and 2) content with weight-management resources will report eating more fruits and vegetables than individuals in all of the other mindset classes.

**Eating away from home.** Individuals in mindset classes characterized by being “low” in both 1) content with weight and 2) content with weight-management resources will report higher rates of eating away from home (i.e. frequency of meals eaten away from home and number of meals per week eaten away from home) than individuals in all of the other mindset classes.

**Sugar-sweetened beverage consumption.** Individuals in mindset classes characterized by being “low” in both 1) content with weight and 2) content with weight-management resources will report higher rates of sugar-sweetened beverage consumption than individuals in all of the other mindset classes.

### **Reasons for Eating**

**Palatable eating motives.** Individuals in mindset classes characterized by being “low” in 1) content with weight, 2) content with weight-management resources, and 3) the belief that one can increase their weight management resources will be more likely to indicate that they eat for reasons other than hunger than individuals in all of the other mindset classes.

**Loss of control over eating.** Individuals in mindset classes characterized by being “low” in both 1) content with weight, and 2) the belief that weight is changeable will report higher levels of loss of control over eating than individuals in all of the other mindset classes.

### **Built Environment**

**Perceived neighborhood safety.** Individuals in mindset classes characterized by being “low” in both 1) content with one’s weight-management resources and 2) the ability to increase one’s access to weight management resources will report lower perceived neighborhood safety than individuals in all of the other mindset classes.

**Perceived food environment.** Individuals in mindset classes characterized by being “low” in both 1) content with weight-management resources and 2) being able to increase one’s access to weight management resources will report less access to healthy food in their neighborhood than individuals in all of the other mindset classes.

### **Social Environment**

**Weight-related social norms.** Individuals in mindset classes characterized by being “low” in both 1) content with weight and 2) content with weight-management resources will report more overweight individuals in their social networks than individuals in all of the other mindset classes.

**Social norms for unhealthy eating and physical activity.** Individuals in mindset classes characterized by being “low” in both 1) content with weight and 2) weight-management resources will report stronger norms for both unhealthy eating and physical activity (norm to not engage in PA) than individuals in all of the other mindset classes.

**Social norms for healthy behavior.** Individuals in mindset classes characterized by being “high” in both 1) content with weight and 2) weight-management resources will report stronger norms for healthy eating behavior among both family and friends than individuals in all of the other mindset classes.

### **Weight Stigma and Self-Stigma**

**Attitudes toward obese persons.** Individuals in mindset classes characterized by being “high” in both 1) the belief that weight is changeable and 2) that one can increase their access to the weight management resources they need will report stronger negative attitudes toward obese persons than individuals in all of the other mindset classes.

**Social physique anxiety.** Individuals in mindset classes characterized by being “low” in both 1) content with weight and 2) the belief that weight is changeable will report higher levels of social physique anxiety than individuals in all of the other mindset classes.

**Weight bias internalization.** Individuals in mindset classes characterized by being “low” in 1) content with weight, but “high” in 2) the belief that weight is changeable will report higher levels of weight bias internalization than individuals in all of the other mindset classes.

## **Dieting History**

**Weight rebound.** Individuals in mindset classes characterized by being “low” in 1) content with weight and 2) the belief that weight is changeable will report higher levels of weight rebound than individuals in all of the other mindset classes.

**Weight suppression.** Individuals in mindset classes characterized by being “low” in 1) content with weight and “high” in 2) the belief that weight is changeable will report higher levels of weight suppression than individuals in all of the other mindset classes.

**Current dieting.** Individuals in mindset classes characterized by being “low” in 1) content with weight and 2) the belief that weight is changeable will be more likely to report that they are currently on a diet than individuals in all of the other mindset classes.

## **Weight Management**

**Implicit theories of weight (high).** Individuals in mindset classes characterized by being “high” in the belief that weight is changeable will report stronger incremental mindsets than individuals in all of the other mindset classes.

**Implicit theories of weight (low).** Individuals in mindset classes characterized by being “low” in the beliefs that weight is changeable will report weaker incremental beliefs than individuals in all of the other mindset classes.

**Body Mass Index (low).** Individuals in mindset classes characterized by being “high” in 1) content with weight, 2) weight management resources, and 3) the belief that weight is changeable will have a lower BMI than individuals in all of the other mindset classes.

**Body Mass Index (high).** Individuals in mindset classes characterized by being “low” in 1) content with weight, 2) weight management resources, and 3) the belief that

weight is changeable will have a higher BMI than individuals in all of the other mindset classes.

## Study 2 Methods

### Study Design and Participants

All hypotheses and analyses were pre-registered prior to data collection<sup>1</sup> (<https://osf.io/57agv>). Data was collected from 859 participants who took an online survey hosted by Qualtrics Survey Software disseminated by Amazon's Mechanical Turk using Turk Prime. To be eligible for participation, interested individuals must not have participated in Study 1, be over 18 years of age, live in the United States, speak English, and have a completion rate of at least 95%, a specification that can be selected using Amazon Mechanical Turk. Given the recent issues with bots on MTurk (Ahler, Roush, & Sood, 2019), several other precautionary measures were used to reduce the likelihood of bots taking the survey. Turk Prime allows users to block suspicious geocode locations and has a universal exclude list. In addition, participants who enter the embedded security key incorrectly were removed from participation by Turk Prime. We also included a Captcha verification at the start of the survey.

**Sample size justification.** Although there is no formal approach to calculating sample sizes for LPA, Dziak, Lanza, and Tan (2014) conducted simulations to identify sample sizes for detecting the appropriate number of latent classes. Their simulations only included  $k=2$  to  $k=6$  classes. However, their estimated sample size criteria is still a useful benchmark. Using these guidelines to calculate sample size given approximately 12

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<sup>1</sup> The 14-item version of the WARM is what we pre-registered, but a re-analysis of the Study 1 data after submitting the preregistration led to the use of the WARM12.

indicator variables (i.e., the items from the WARM), a medium effect of .3, the recommended sample size for 80% power and is 519 and is 637. The authors recommend adding a conservative multiplier of 1.15 if possible, making these values 597 and 731. We therefore settled on a sample size of 700<sup>2</sup>.

**Procedure.** The procedure involved completing a Qualtrics survey online disseminated via Amazon Mechanical Turk.

**Measures** (see Appendix G for full set of measures)

***Weight and resources mindset questionnaire.*** This is the 12-item, four-factor scale developed in Study 1 that measures 1) how content one is with their weight 2) whether they believe weight is changeable 3) how content one is with their weight management resources 4) whether they believe they can access more of the weight management resources they need. Participants rated how much they agree with each of the 12 items on a scale from (1) strongly disagree to (6) strongly agree.

***Godin leisure-time exercise questionnaire (Godin, 1985; 2011).*** This 3-item questionnaire measures the level of exercise an individual engages in on an average week. The original scale measures the number of times per week an individual engages in strenuous, moderate, and light exercise. The scale was modified to ask participants the number of days per week they engage in each of these types of exercise. In line with common practice, total exercise was calculated by multiplying the number of days on which each individual completed a strenuous exercise session by 9, a moderate exercise

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<sup>2</sup> The study concluded with a final sample of 859 because a computer glitch led data collection not to terminate as intended.

session by 5, and a mild/light exercise session by 3 for a total score signifying total exercise per week.

***Behavioral risk factor surveillance system - modified fruit and vegetable consumption (BRFSS; Blanchard, 2009).*** This 6-item questionnaire measures the fruit and vegetable intake of an individual in the most recent week. Participants report how many times per day they consumed 100% pure fruit juice, fresh fruit, beans and legumes, dark green vegetables, orange-colored vegetables, and other vegetables. For example, participants answered the question, “During the past week, on average, how many times per day did you eat fresh fruit? Note: Do not include fruit juice or dried fruit such as raisins”. Total score is calculated as the mean of the six items, and higher scores indicate higher fruit and vegetable consumption.

***EARLY trials sugar-sweetened beverage consumption (Nelson & Lytle, 2009).*** This 4-item questionnaire measures ( $\alpha = 0.65$ ) how often individuals consume four types of sugar-sweetened beverages (i.e., soda, fruit drinks, sports drinks, and energy drinks). Participants responded to items such as, “Over the past 30 days, how often did you drink soda or pop?”. Response options ranged from (1) never to (10) 6 or more times per day. Total score was calculated as the mean of the four items, with higher scores indicating more frequent sugar-sweetened beverage consumption.

***EARLY trials common elements: eating away from home (Nelson & Lytle, 2009).*** This 3-item questionnaire ( $\alpha = 0.71$ ) measures how often one goes out to eat in terms of both general frequency and number of meals per week. Participants responded to items such as “Over the past 30 days, how many times did you buy food at a fast food restaurant, such as McDonald’s, Burger King, Arby’s, Wendy’s, Hardee’s, Captain D’s,



Taco Bell, Taco Johns, Chipotle, KFC, Bojangles', Pizza Hut, Panera, Quiznos?").

Response options ranged from (1) never or rarely to (9) three or more times per day. The total score was the mean of the three items, with higher scores indicating a higher frequency of meals eaten away from home.

***Palatable eating motives questionnaire (Burgess, Turan, Lokken, Morse, & Boggiano, 2014).*** This 4-item scale ( $\alpha = 0.94$ ) measures the extent to which an individual eats food to cope rather than to satisfy hunger over the past four weeks. Participants reported how often they had an experience such as, "I felt like the craving to eat overpowered me" during a time when they were eating. Responses ranged from (1) never to (5) always, and the total score was calculated as the mean of the four items. Higher scores indicate greater frequency of eating for reasons other than to satisfy hunger.

***Loss of control over eating scale (Latner, Mond, Kelly, Haynes, & Hay, 2014).*** This 7-item scale ( $\alpha = 0.95$ ) measures the extent to which an individual feels they do not have control over their eating behavior, specifically in relation to binge eating. Participants were asked to report how often they ate/drank tasty foods and drinks such as sweets, salty snacks, fast food, or sugary drinks for reasons such as "to forget your worries," or "because it helps you when you feel nervous". Response options ranged from (1) almost never/never to (5) almost always/always with higher scores indicating a higher frequency of eating for these reasons. Total score was calculated as a mean of the seven items.

***MESA perceived neighborhood safety (Lenhart et al., 2017).*** This 2-item scale ( $\alpha = 0.65$ ) measures the extent to which an individual feels their neighborhood is safe and free of violence. Participants indicated how much they agree with the statements "I

feel safe walking in my neighborhood day or night,” and “Violence is a problem in my neighborhood,” on a scale from (1) strongly disagree to (5) strongly agree. Total score was the mean of these two items with the second item reverse coded, with higher scores indicating greater neighborhood safety.

***Perception of food environment (Ma et al., 2013).*** This 5-item scale ( $\alpha = 0.84$ ) measures an individual’s evaluation of the options they have for purchasing food in their neighborhood and whether or not it is adequate. Participants indicated how much they agree or disagree with four statements such as “A large selection of fresh fruits and vegetables is available in my neighborhood,” on a scale from (1) strongly disagree to (5) strongly agree. They then responded to the item “How much of a problem would you say that lack of access to adequate food shopping is in your neighborhood?” from (1) not really a problem to (4) very serious problem. Total score was the sum of all five items with two items reverse coded, such that higher scores indicate a healthier food environment.

***Weight-related social norms scale (Leahey, LaRose, Fava, & Wing, 2011).*** This 3-item scale ( $\alpha = 0.76$ ) measures the participant’s perception of the proportion of overweight individuals in their social network. Participants indicated the proportion of casual friends, relatives, and colleagues/classmates who are overweight from (1) none to (5) all. Total score was the mean of these three items.

***Social norms for health behavior (Pelletier, Graham, & Laska, 2014 Adapted from Project EAT; Larson, Neumark-Sztainer, Story, van den Berg, Hannan, 2011).*** This scale ( $\alpha = 0.71$ ) measures how much one’s family/friends drink sugar-sweetened beverages, eat fast food, eat fruits and vegetables, and prepare meals at home. Items were

reworded to ask “how much” rather than to what extent so the statements match the response options. For example, participants answered the question, “how much does your family drink sugar sweetened beverages?” The response scale ranged from (1) not at all to (4) very much. The mean of the four items asking about family was used as a measure of family social norms, and the mean of the four items asking about friends was used as a measure of friend social norms. Higher scores indicate stronger social norms for the health behavior (e.g. stronger norm for eating fruits and vegetables).

***Social norms for unhealthy eating and physical inactivity (Leahey, Doyle, Xu, Bihuniak, & Wing, 2015).*** This two-part questionnaire measures how acceptable it is in an individual’s social group to eat in an unhealthy manner ( $\alpha = 0.69$ ) and be inactive ( $\alpha = 0.26$ ). We reworded the original eating questions so that all questions ask about the same three behaviors (i.e. eat large portions, unhealthy food, or have second helpings). For example, to measure social norms for unhealthy eating, participants were asked, “how acceptable is it among your friends to eat unhealthy foods, large portions, or have second helpings?”. An example question measuring physical inactivity was “how often do your friends discourage you from exercising?” Responses matched the questions, but all had four response options (e.g. (1) very unacceptable to (4) very acceptable; (1) never to (4) very often). Social norms for unhealthy eating was the mean of the three eating-related items, and social norms for physical activity was the mean of the two exercise related items. Higher scores indicate stronger norms for unhealthy eating and physical inactivity.

***Attitudes toward obese persons scale (Allison, Basile, Yuker, 1991).*** This 20-item scale ( $\alpha = 0.83$ ) measures perceptions and attitudes about obese people. Participants responded to items such as “most obese people feel that they are not as good as other

people,” on a scale from (1) I strongly disagree to (6) I strongly agree. The total score was calculated as the mean of the 20 items with certain items reverse scored such that higher scores indicate more negative/stigmatizing attitudes.

***Social physique anxiety (Hart, Leary, & Rejeski, 1989).*** This 12-item scale ( $\alpha = 0.91$ ) measures the extent to which an individual is anxious about their body shape and size. Participants rated the extent to which they agree or disagree with items such as, “I wish I wasn't so uptight about my physique or figure,” and “There are times when I am bothered by thoughts that other people are evaluating my weight or muscular development negatively” on a scale from (1) not at all characteristic of me to (5) extremely characteristics of me. Total score was calculated as the mean of the 12-items with five items reverse scored such that higher scores indicate increased social physique anxiety.

***Weight bias internalization-modified (Apay, Yilmaz, Aksoy, Aklin, 2017).*** This 11-item scale ( $\alpha = 0.83$ ) measures the extent to which social weight stigma has affected an individual's self-perception. The scale was modified to be relevant to individuals of all body weights. Participants indicated how much they agree or disagree with items such as “because of my weight, I feel that I am just as competent as anyone,” and “I feel anxious about my weight because of what people might think of me,” on a scale from (1) strongly disagree to (7) strongly agree with one item reverse scored such that higher scores indicate increased weight bias internalization.

***Implicit theories of weight (Burnette, 2010).*** As in Study 1, this 6-item scale ( $\alpha = 0.86$ ) measures the extent to which an individual believes that body weight is something that is changeable. Each item was rated from (1) strongly disagree to (6)

strongly agree. The total score was calculated as the mean of the six items with higher scores indicating a stronger belief that weight is changeable.

***Dieting and weight history questionnaire (Witt, Katterman, Lowe, 2013).*** This questionnaire measures the previous dietary practices (if any) and weight history of individuals. Participants report the most they have ever weighed since reaching their current height, the least they have ever weighed since reaching their current height, their current weight, and whether they are currently on a diet. They were also asked how old they were when they went on their first diet and how their weight has varied over the last six months, but these items were included only for exploratory purposes. Weight suppression is calculated as one's highest weight minus their current weight with higher scores indicated increased weight suppression. Weight rebound is calculated as one's current weight minus one's lowest weight with higher scores indicated increased weight rebound.

***Subjective socioeconomic status (Adler et al., 2000).*** As in Study 1 participants rated their subjective socioeconomic status from (1) worst off to (10) best off. They were asked to use the United States as their reference group and told that those who were the worst off were those who have the least money and education, and the least respected jobs or no job. Those who are the best off have the most money, the most education, and the most respected jobs.

### **Statistical Analysis**

The EFA, CFA, and LPA were conducted using the same analysis techniques as Study 1. ANOVAs/logistic regression were used to examine differences across groups based on each hypothesis. For each of the four subscales, each mindset class was ranked in

terms of whether individuals in the class are, on average, “high”, “moderate”, or “low” on each subscale. As noted, this was done by dividing the one to six scale equally into three parts such that scores from 1-2.66 were classified as “low”, scores from 2.66-4.32 were classified as “moderate”, and scores from 4.32 to 6 were classified as “high”. These ratings will then be used to examine differences across groups using ANOVA and linear contrasts.

For example, to examine the hypothesis that *individuals in mindset classes characterized by being “high” in 1) content with weight and 2) content with weight-management resources will report the highest levels of exercise per week*, I will first identify the groups that I have determined are “high” in both the content with weight subscale and content with weight management resources subscale. Individuals in these groups will then be grouped together and be compared to individuals in all other groups using weighted contrasts.

## Study 2 Results

### Participant Characteristics

The final total sample was 859 individuals who completed the full WARM. There were no participants who reported a BMI greater than 65. In addition, after examining individuals with BMI below 15 ( $n=31$ ), the data from these individuals was retained as the extreme BMIs seemed primarily due to typos. Men made up 40.40% of the sample ( $n=347$ ), women made up 54.25%, 0.35% selected not listed, and 5.01% chose not to respond. The mean age of participants was 37.00 ( $SD = 12.64$ ). A majority of the sample (68.33%) identified themselves as European/Caucasian American, 11.87% as Black/African American, 6.17% as Asian/Pacific Islander, 4.42% as Latino/Hispanic American, 5.23% indicated that they were multiracial, and 0.35% as Indian/Native

American, 0.58% not listed, and 4.66% did not respond. The mean BMI was 26.62 ( $SD = 8.46$ ).

### **WARM: Normality of the subscales**

Scores for three of the four subscales of the WARM were relatively normally distributed: CW: skew = 0.41, kurtosis = -0.74; CR: skew = -0.25, kurtosis = -0.90; RC: skew = -0.75, kurtosis = 0.95. The weight is changeable subscale had adequate kurtosis but was negatively skewed (WC: skew = -6.61, kurtosis = -0.46).

### **WARM: Item Correlations**

Item-level correlations were computed for each of the four subscales. Some correlations exceeded 0.70 and none exceeded 0.80 (see Table 24).

Table 24. *Item correlations for each subscale of the WARM*

WARM Items		
	CW2	CW2
CW1	0.67	
CW2	0.66	0.79
	WC2	WC3
WC1	0.75	
WC2	0.72	0.74
	CR2	CR3
CR1	0.61	
CR2	0.76	0.66
	RC2	RC3
RC1	0.75	
RC2	0.70	0.75

### **WARM: Reliability**

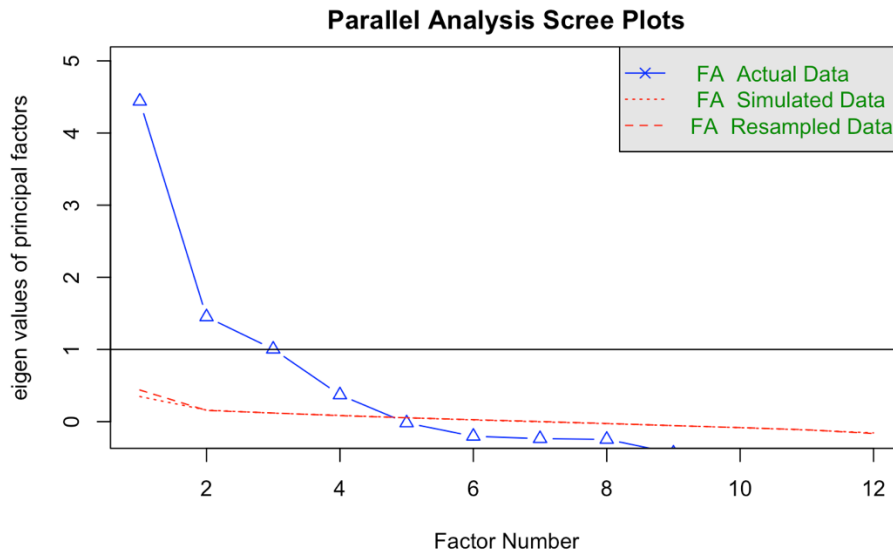
The Cronbach's alpha for each of the four subscales and the full WARM indicated more than adequate reliability: CW:  $\alpha = 0.88$  CI[0.86, 0.89]; WC:  $\alpha = 0.89$

CI[0.88, 0.91]; CR:  $\alpha = 0.86$  CI[0.85, 0.88]; RC:  $\alpha = 0.89$  CI[0.88, 0.90]; Total WARM:  $\alpha = 0.90$  CI[0.89, 0.91].

### WARM: Exploratory Factor Analysis

Examination of the scree plot (see Figure 5) suggested that the best solution was to retain four factors. The blue line shows eigenvalues of the data, the large drop and subsequent leveling off after four factors suggests that the four factor solution is the best fit to the data. Finally, parallel analysis suggested retaining four factors.

Figure 5. EFA parallel analysis scree plot for WARM



**Four-factor solution.** The total variance explained by the four-factor solution was 73.01%. Examination of the communalities showed all variables to have adequate communality of 0.40 or higher. The rotated solution showed that the first factor explained 39.35% of the variance and had an eigenvalue of 4.72, the second explained 16.67% and had an eigenvalue of 2.00, the third explained 11.83% and had an eigenvalue of 1.41, and the fourth explained 5.16% and had an eigenvalue of 0.62. The largest correlation



between factors was 0.64, which was between the weight is changeable factor and the content with resources factor. Table 25 shows the full correlation matrix of the factors for the four-factor solution. Importantly, the item that previously loaded in excess of 1.00 did not present as a Heywood case in this larger sample. Table 26 shows model fit statistics suggesting the four factor model is a good fit to the data as they all meet recommended criteria. Examination of the factor loadings revealed that all items load most strongly onto the target factor (see Table 27). One item, CR2 had a loading of 0.44 onto the content with resources factor as well as 0.31 onto the weight is changeable factor. A path diagram can be found in Appendix H.

Table 25. *Factor correlations for the WARM four-factor solution*

Factors			
	CW	WC	CR
WC	.32		
CR	.44	.64	
RC	.11	.44	0.32

Table 26. *EFA model fit statistics for WARM*

# of Factors	RMSEA	SRMR	Tucker-Lewis	BIC
4	0.03* CI [0.02 0.05]	0.01*	0.99*	-118.93

\*indicates the statistic reaches established criteria

Table 27. *Four-factor solution factor loadings for the WARM*

	Factor 1	Factor 2	Factor 3	Factor 4
CW1	-0.08	-0.07	0.78	0.03
CW2	0.01	0.05	0.91	-0.04
CW3	0.06	0.00	0.85	0.03
WC1	0.87	0.00	-0.06	0.02
WC2	0.83	0.00	0.07	0.03
WC3	0.87	0.00	0.00	-0.03
CR1	0.01	-0.02	0.05	0.80
CR2	0.31	0.11	0.12	0.44
CR3	-0.02	0.01	-0.04	0.94
RC1	-0.01	0.83	0.00	0.01
RC2	-0.05	0.91	0.02	0.01
RC3	0.07	0.83	-0.03	-0.03

### Confirmatory Factor Analysis

The four-factor model using the indicators was a good fit to the data. The chi-square test ( $X^2(48) = 256.78$ ,  $p = 0.00$ ) rejected the model. The RMSEA for the model was 0.07, the SRMR was 0.05, the comparative fit index was 0.97, and the Tucker-Lewis Index was 0.96. These fit statistics meet or marginally meet general recommendations for model fit, (i.e. RMSEA:  $\leq 0.06$ , SRMR:  $\leq 0.08$ , and CFI, TLI:  $\geq 0.9$ ) suggesting that the 12-item WARM covariance structure is well-modeled by a latent, four-factor model. In addition, parameter estimates indicated that all items were strong indicators of their respective factors with standardized loadings ranging from 0.74 to 0.90 (see Table 28), and the z-value of each loading reached significance. A path diagram can be found in Appendix I.

Table 28. *CFA four-factor solution factor loadings for WARM*

	Loading	p-value
CW1	0.74	0.00
CW2	0.89	0.00
CW3	0.90	0.00
WC1	0.85	0.00
WC2	0.89	0.00
WC3	0.84	0.00
CR1	0.83	0.00
CR2	0.78	0.00
CR3	0.87	0.00
RC1	0.84	0.00
RC2	0.90	0.00
RC3	0.84	0.00

### Latent Profile Analysis

The LPA analysis revealed the 5-class, 6-class, 7-class, and 8-class solutions to be the best fits to the data (see Table 29). These models had the lowest BIC, AIC, and adjusted BIC. They also had high entropy scores. An examination all four of these models revealed that the simpler models did not adequately distinguish individuals in terms of their beliefs and that the variance captured by the 8-class model captured true variance in individuals mindsets. For example, a class for which individuals indicated that they are mildly content with their weight, believe weight is changeable, are content with their resources, but do not believe they can increase their access to resources was only present in the 8-class model. The 8-class model also had two classes of those who endorse all four subscales, but one group endorses them very strongly whereas the other was more moderate in their endorsement. The 5-class, 6-class, and 7-class solutions can

be found in Appendix J. Although the results of each LPA are independent of one another, they are lined up in the appendix such that it is clear which class is the “new” class that is gained by choosing the less parsimonious model. In each case, it was determined that the class was an important additional class for both understanding differences in beliefs that individuals hold about weight and weight change and for predicting the health and weight management related behaviors of these individuals.

The average class probabilities, the likelihood that the class to which an individual is assigned is their “true” class was also high for the 8-class model (88.6%-97.3%). In addition, across the eight classes, less than 20% of individuals had class probabilities less than 70% and this was true of less than 10% of individuals in five of the eight classes. Finally, the classes revealed in the 8-class model in Study 1 closely map those found in Study 2. Table 30 shows mean scores for each of the items for the 8-class model as well as the number of individuals assigned to each class. I selected the 8-class model as the final model as the 8-class model was a slightly better overall fit to the data, and the 8 classes each showed unique patterns of endorsement across the 12-items and across the four subscales of the WARM (see Table 30). In other words, all of the classes appeared to be a true representation of a set of beliefs and not some form of empirical artifact.

Table 29. *Model fit statistics for LPA of the WARM*

Classes	BIC	% change BIC	AIC	Adjusted BIC	% change Adjusted BIC	Log likelihood	Entropy	% change Entropy
2	33995.98		33820.02	33878.48		-16873.00	0.886	
3	33091.87	2.66%	32854.08	32933.08	2.79%	-16377.04	0.888	-0.23%
4	32385.60	2.13%	26770.33	32185.53	2.27%	-15979.99	0.897	-1.01%
5	31948.74	1.35%	31587.31	31707.39	1.49%	-15717.65	0.894	0.33%
6	31730.67	0.68%	31307.4	31448.03	0.82%	-15564.70	0.902	-0.89%
7	31505.2	0.71%	31020.12	31181.28	0.85%	-15408.06	0.889	1.44%
8	31281.84	0.71%	30734.93	30616.63	1.81%	-15252.46	0.900	-1.24%
9	31191.90	0.29%	30583.16	30785.41	-0.55%	-15163.58	0.900	0.00%

Table 30. *8-class solution N and mean scores for each item for each class*

	Class 1	Class 2	Class 3	Class 4	Class 5	Class 6	Class 7	Class 8
N	109	34	153	176	19	143	81	144
Item								
CW1	1.87	1.73	3.10	1.61	4.13	1.66	4.56	3.71
CW2	2.01	1.53	3.47	1.94	3.70	2.20	5.47	4.86
CW3	2.11	1.79	3.92	2.40	5.03	2.86	5.76	5.24
WC1	2.34	4.21	3.69	4.79	4.46	5.58	5.77	5.05
WC2	2.33	3.92	3.67	4.63	4.61	5.60	5.79	5.35
WC3	2.30	4.13	3.63	4.84	4.42	5.57	5.78	5.34
CR1	2.26	2.64	3.77	3.36	5.06	5.02	5.66	4.63
CR2	2.40	2.60	3.66	3.83	5.01	5.46	5.80	5.29
CR3	2.55	2.74	3.71	3.62	5.37	5.29	5.77	4.93
RC1	4.87	2.32	3.78	4.24	1.71	5.32	5.75	4.45
RC2	4.79	2.31	3.91	4.25	1.60	5.34	5.78	4.43
RC3	4.86	2.34	3.84	4.44	1.55	5.40	5.83	4.58

## The Association Between Weight Mindset and Weight and Health Related

### Outcomes

One of the primary reasons for conducting the LPA was to not only identify differences in response patterns on the WARM, but also examine differences in other health and weight related variables across mindsets. One of the outcomes of the LPA is that each individual is assigned a likelihood score for each class based on the extent to

which their pattern of endorsement matches the pattern for that class. The most likely class can be identified for each individual. The classes can then essentially be treated as an independent variable and differences can be examined across classes. The caveat to this is that researchers have to be mindful that the class to which an individual is assigned is never a 100% accurate representation of a given individual's weight mindset. However, this minor cost does not outweigh the benefit of being able to examine differences across classes. For each of the following outcomes, results will be presented that specifically test the associated *a priori* hypotheses.

Exploratory analysis will then be presented for each outcome in which differences across all 8 classes will be presented along with any other additional analyses. As noted, the hypotheses were written to answer questions about groups that are “high” or “low” in certain subscales. Table 31 shows the mean scores for each of the four subscales for the eight weight mindsets. “High” scores are dark gray, “moderate” scores are colored in light gray, and “low” scores are white. The table also includes the mean endorsement for each of the outcomes. The table also includes the mean endorsement for each of the outcomes, which are also colored on the white to dark gray color scale where darker indicates a more “positive” outcome and lighter indicates a “negative” outcome, with yellow indicating a more moderate outcome. For example, the highest exercise score is dark gray and the lowest is white because a higher score indicates a more positive outcome. Conversely, the highest score for sugar-sweetened beverage consumption is colored in white and the lowest score is colored dark gray because consuming fewer sugar-sweetened beverages is a more positive outcome. When there was no clear positive

or negative outcome, all scores remain colored white. The percent men and women in each class in also included in Table 31.

Table 31. *Mean endorsement for each WARM subscale, mean score for each outcome measure, and gender breakdown for the 8-class model*

Class	1	2	3	4	5	6	7	8
<b>WARM Subscale</b>								
Content Weight	1.98	1.63	3.51	1.96	4.32	2.22	5.31	4.61
Change Weight	2.3	4.09	3.65	4.75	4.46	5.59	5.81	5.27
Content Resources	2.39	2.68	3.69	3.61	5.19	5.25	5.77	4.97
Change Resources	4.84	2.3	3.84	4.3	1.61	5.36	5.84	4.51
<b>Behavior</b>								
Exercise	56.17	35.32	44.81	31.33	49.47	39.05	50.64	42.85
Fruit & Veg	17.93	9.40	12.73	8.45	14.63	8.28	9.41	8.51
S-S Beverages	3.88	2.77	3.00	2.41	2.43	2.40	1.89	2.21
Eat Out	3.74	2.25	2.91	2.50	2.05	2.29	2.01	2.21
<b>Reasons for Eating</b>								
Pal. Eating Mot.	3.25	2.54	2.30	2.39	1.62	1.86	1.42	1.43
Loss of Cont. Eat	3.37	2.57	2.30	2.59	1.56	2.19	1.30	1.46
<b>Environment</b>								
Neighborhood Saf.	2.65	3.10	2.76	3.06	3.05	3.09	3.58	3.27
Perc. Food Env.	3.74	3.02	3.35	3.49	3.39	3.73	4.07	3.75
<b>Social Norms</b>								
Weight-Related	3.25	2.97	2.53	2.64	2.46	2.55	2.23	2.40
Healthy Eat (Fam)	2.13	2.24	2.22	2.32	2.65	2.54	2.68	2.54
Healthy Eat (Fr)	2.00	1.91	2.06	1.97	2.19	2.09	2.23	2.05
Physical Inactivity	2.63	2.34	2.25	2.14	2.00	2.04	1.89	1.95
Unhealthy Eating	2.76	3.02	2.49	2.62	2.41	2.57	2.46	2.55
<b>Weight-Related Attitudes</b>								
Att. Obese Persons	3.66	3.19	3.17	3.04	3.20	3.09	3.05	2.88
Soc. Phys. Anxiety	2.76	3.36	2.29	3.04	2.00	2.84	1.56	1.75
Wt. Bias Internal.	4.67	4.61	3.28	4.33	2.35	3.70	1.43	1.88
Implicit Th. Wt.	3.16	3.90	3.40	4.25	4.00	4.77	4.99	4.43
<b>Weight</b>								
BMI	24.86	33.38	25.22	30.08	24.21	27.97	23.14	24.45
Weight Rebound	31.71	36.25	25.16	37.40	17.75	33.60	13.47	19.85
Weight Suppress.	20.67	20.03	20.76	22.12	17.58	24.31	23.74	21.22
% Dieting	48.00	29.00	25.00	32.00	29.00	42.00	19.00	16.00
Gender (% M/F)	60/38	15/85	50/50	29/71	35/65	38/60	46/53	48/52
N	32	17	98	95	178	114	132	136

\*indicates skewed variable

**The association between mindset class and exercise behavior.** The hypothesis that individuals in mindset classes characterized by being “high” in both 1) content with weight and 2) content with weight-management resources (i.e. Class 7 and 8) will report higher levels of exercise than individuals in all of the other mindset classes was supported ( $F(1, 843) = 4.50, p < .05$ ). Specifically, the combined mean for those in mindset Classes 7 and 8 ( $M = 45.68, SD = 28.07$ ) was different than the mean for all other classes ( $M = 41.32, SD = 27.07$ ).

**Exploratory analysis.** Further review of means across classes (see Table 31) revealed that although the hypothesis was supported, Class 1 reported the most exercise among all the classes ( $M = 56.17, SD = 32.11$ ) whereas the means for all other classes ranged from 31.33 (Class 4) to 50.64 (Class 7). Although the mean content with weight value for Class 5 did not reach the threshold for “high” ( $M = 4.31$ ), when Class 5 was included along with Class 7 and 8 as being high in both content with weight and content with weight management resources, the results remained significant ( $F(1, 843) = 6.01, p < .05$ ). This analysis was included because Class 7 and Class 8 were both high on all four subscales whereas Class 5 was low on can increase access to weight management resources. Including it gives insight that classes high in content with weight and content with weight management resources report increased exercise regardless of their endorsement of the can increase access to weight management resources subscale, a conclusion that was not possible by examining only Class 7 and Class 8.

**The association between mindset class and consumption of fruits and vegetables.** Due to some reports of extremely high consumption of fruits and vegetables, those who had scores greater than 100, indicating greater than 100 servings of vegetables



per week, were removed from this analysis ( $N = 26$ ). The hypothesis that individuals in mindset classes characterized by being “high” in both 1) content with weight and 2) content with weight-management resources (i.e. Class 7 and Class 8) would report eating more fruits and vegetables than individuals in all of the other mindset classes was not supported ( $F(1, 851) = 105.51, p < .001$ ) and in fact was the reverse of what was expected. Specifically, the combined mean for those in Class 7 and Class 8 ( $M = 8.83, SD = 6.23$ ) was significantly less than the mean for all other classes ( $M = 11.06, SD = 13.05$ ).

***Exploratory analysis.*** Further review of means across classes (see Table 31) revealed that Class 1, Class 3, and Class 5 reported the highest rates of fruit and vegetable consumption (Class 1:  $M = 17.93, SD = 19.45$ ; Class 3:  $M = 12.73, SD = 15.17$  Class 5:  $M = 14.63, SD = 15.29$ ), whereas the means for all other classes ranged from 8.45 (Class 4) to 9.41 (Class 7).

**The association between mindset class and consumption of sugar sweetened beverages.** The hypothesis that individuals in mindset classes characterized by being “low” in both 1) content with weight and 2) content with weight-management resources (i.e. Class 1) will report higher rates of sugar-sweetened beverages than individuals in all of the other mindset classes was supported ( $F(1, 848) = 109.89, p < .001$ ). Specifically, the mean for those in mindset Class 1 ( $M = 3.88, SD = 1.89$ ) was significantly greater than the mean for all other classes ( $M = 2.45, SD = 1.26$ ).

***Exploratory analysis.*** Further review of means across classes (see Table 31) revealed that individuals in Class 1 and Class 3 reported the highest rates of sugar-sweetened beverage consumption (Class 1:  $M = 3.88, SD = 1.89$ , Class 3:  $M = 3.00, SD = 1.42$ ) whereas the means for all other classes ranged from 1.88 (Class 7) to 2.77 (Class

2). Although the mean content with weight value for Class 2 was slightly greater than the threshold for “low” ( $M = 2.68$ ), when Class 2 was included along with Class 1 as being low in both content with weight and content with weight management resources, the results remained significant ( $F(1, 84) = 93.82, p < .05$ ).

**The association between mindset class and eating away from home.** The hypothesis that individuals in mindset classes characterized by being “low” in both 1) content with weight and 2) content with weight-management resources (i.e., Class 1) will report higher rates of eating away from home (e.g. number of meals per week eaten away from home) than individuals in all of the other mindset classes was supported ( $F(1, 849) = 165.55, p < .001$ ). Specifically, the mean for those in mindset Class 1 ( $M = 3.75, SD = 1.59$ ) was significantly greater than the mean for all other classes ( $M = 2.41, SD = 0.94$ ).

**Exploratory analysis.** Further review of means across classes (see Table 31) revealed that individuals in Class 1 reported much higher rates of eating away from home ( $M = 3.75, SD = 1.59$ ) compared to all other classes. The means for all other classes ranged from 2.00 (Class 7) to 2.91 (Class 3). Similar to sugar-sweetened beverages, when Class 1 and Class 2 were both included in the analysis as being low in both content with weight and content with weight management resources, the results remained significant ( $F(1, 849) = 109.43, p < .001$ ).

**The association between mindset class and palatable eating motives.** The hypothesis that individuals in mindset classes characterized by being “low” in 1) content with weight, 2) content with weight-management resources, and 3) the belief that one cannot increase their weight management resources will be more likely to indicate that they eat for reasons other than hunger (i.e. high scores for palatable eating motives) than

individuals in all of the other mindset classes could not be tested. None of the classes met all three criteria. Class 1 met the first two, but not the third criteria, and Class 2 met the first and third but not the second criteria.

**Exploratory analysis.** Further review of means across classes that those in Class 1 most strongly endorsed that they eat for reasons other than hunger ( $M = 3.25$ ,  $SD = 1.14$ ) followed by those in Class 2 ( $M = 2.54$ ,  $SD = 1.31$ ). This potentially suggests that it is the combination of reporting low content with weight and either low in content with weight management resources or low in can increase access to weight management resources that is associated with higher endorsement of palatable eating motives.

**The association between mindset class and loss of control over eating.** The hypothesis that individuals in mindset classes characterized by being “low” in both 1) content with weight, and 2) the belief that weight is changeable (i.e. Class 1) will report higher levels of loss of control over eating than individuals in all of the other mindset classes was supported ( $F(1, 839) = 202.84$ ,  $p < .001$ ). Specifically, the mean for Class 1 ( $M = 3.37$ ,  $SD = 0.94$ ) was significantly greater than the mean for all other classes ( $M = 2.22$ ,  $SD = 1.07$ ).

**Exploratory analysis.** Further analysis of means across classes (see Table 31) revealed that Class 1 had the highest overall endorsement of loss of control over eating ( $M = 3.37$ ,  $SD = 0.94$ ) whereas the means for all other classes ranged from 1.30 (Class 7) to 2.60 (Class 4).

**The association between mindset class and neighborhood safety.** The hypothesis that individuals in mindset classes characterized by being “low” in both 1) content with one’s weight-management resources and 2) the ability to increase one’s

access to weight management resources will report lower perceived neighborhood safety than individuals in all of the other mindset classes could not be tested. None of the classes met both of the criteria. The mean content with weight management resources for Class 2 just surpassed the threshold for “low”. However, comparing Class 2 to all other classes still did not provide support for this hypothesis, ( $F(1, 838) = 0.14, p = 0.71$ ). Specifically, the mean for Class 2 ( $M = 3.10, SD = 0.97$ ) was not different than the mean for all other classes ( $M = 3.04, SD = 0.93$ ).

***Exploratory analysis.*** Further analysis revealed that those in Class 7 most strongly believe that their neighborhood is safe ( $M = 3.57, SD = 0.74$ ) followed by those in Class 8 ( $M = 3.27, SD = 0.85$ ). Mean endorsement for the remaining classes ranged from 2.65 (Class 1) to 3.09 (Class 6). Given these results, what is potentially most notable is that those who most strongly endorsed each of the four subscales (i.e. Class 7 and Class 8) believe they have the safest neighborhoods. There is less evidence of the relation between weight mindset and low perceived neighborhood safety.

#### **The association between mindset class and perceived food environment.**

Similar to perceived neighborhood safety, the hypothesis that individuals in mindset classes characterized by being “low” in both 1) content with one’s weight-management resources and 2) being able to increase one’s access to weight management resources will report less access to healthy food in their neighborhood than individuals in all of the other mindset classes could not be tested.

***Exploratory analysis.*** Further analysis of means across classes (see Table 31) revealed that individuals in Class 2 reported the lowest levels of access to healthy food ( $M = 3.02, SD = 0.87$ ) whereas the means for all other classes ranged from 3.35 (Class 3)

to 4.07 (Class 7). The mean score for Class 2 on the content with weight management resources subscale was 2.68, slightly above the 2.66 threshold for being categorized as “low” and the mean score was below the “low” threshold for increase access to weight management resources. The hypothesis was therefore tested using Class 2 because it was the class that most closely fit the hypothesized criteria. The hypothesis was supported ( $F(1, 838) = 14.42, p < .001$ ). Specifically, the mean for Class 2 ( $M = 3.02, SD = 0.87$ ) was significantly less than the mean for all other classes ( $M = 3.64, SD = 0.94$ ).

**The association between mindset class and overweight individuals in one’s social network.** The hypothesis that individuals in mindset classes characterized by being “low” in both 1) content with weight and 2) content with weight-management resources (i.e. Class 1) will report more overweight individuals in their social networks (i.e. casual friends, relatives, and colleagues) than individuals in all of the other mindset classes was supported ( $F(1, 838) = 90.78, p < .001$ ). Specifically, the mean for Class 1 ( $M = 3.25, SD = 0.90$ ) was significantly greater than the mean for all other classes ( $M = 2.52, SD = 0.72$ ).

**Exploratory analysis.** Further analysis of means across classes (see Table 31) revealed that individuals in Class 1 ( $M = 3.25, SD = 0.90$ ) and Class 2 ( $M = 2.97, SD = 0.72$ ) reported the greatest proportion of overweight individuals among their friends, relatives, and colleagues whereas the means for all other classes ranged from 2.23 (Class 7) to 2.55 (Class 6). Once again, although the mean content with weight value for Class 2 was slightly greater than the threshold for “low” ( $M = 2.68$ ), when I included Class 2 along with Class 1 as being low in both content with weight and content with weight management resources, the results remained significant ( $F(1, 838) = 100.72, p < .001$ ).

**The association between mindset class and social norms for health behavior.**

The hypothesis that individuals in mindset classes characterized by being “high” in both 1) content with weight and 2) content with weight-management resources (i.e. Class 7 and Class 8) will report stronger norms for healthy eating behavior among both family and friends than individuals in all of the other mindset classes was supported for family ( $F(1, 833) = 40.55, p < 0.001$ ) and for friends ( $F(1, 833) = 4.12, p = 0.04$ ). Specifically, the combined mean for Class 7 and Class 8 (family:  $M = 2.59, SD = 0.55$ ; friends:  $M = 2.11, SD = 0.56$ ) were significant greater than the mean for all other classes (family:  $M = 2.32, SD = 0.56$ ; friends:  $M = 2.03, SD = 0.53$ ).

**Exploratory analysis.** Further analysis of means across classes (see Table 31) for family revealed that the means were lowest for Class 1 ( $M = 2.13$ ), Class 3 ( $M = 2.22$ ), Class 2 ( $M = 2.24$ ), and Class 4 ( $M = 2.32$ ), and highest for Class 6 ( $M = 2.54$ ), Class 8 ( $M = 2.54$ ), Class 5 ( $M = 2.65$ ), and Class 7 ( $M = 2.68$ ) indicating perhaps that there is a relation between perceived access to resources and social norms among family regardless of whether one is content with their weight. For friends, the means ranged only from 1.91 (Class 2) to 2.23 (Class 7) indicating that there is little variation in social norms for health behavior among friends across weight mindsets.

**The association between mindset class and social norms for not engaging in physical activity.** The hypothesis that individuals in mindset classes characterized by being “low” in both 1) content with weight and 2) content with weight-management resources (i.e. Class 1) will report stronger norms for not engaging in physical activity than individuals in all of the other mindset classes was confirmed ( $F(1, 835) = 81.30, p$

<.001). Specifically, the mean for Class 1 ( $M = 2.63$ ,  $SD = 0.78$ ) was significantly greater than the mean for all other classes ( $M = 2.09$ ,  $SD = 0.56$ ).

**Exploratory analysis.** Further analysis of means across classes (see Table 31) revealed that individuals in Class 1 ( $M = 2.63$ ,  $SD = 0.78$ ) reported the strongest social norms for not engaging in physical activity followed by Class 2 ( $M = 2.34$ ,  $SD = 0.55$ ), Class 3 ( $M = 2.25$ ,  $SD = 0.57$ ), and Class 4 ( $M = 2.14$ ,  $SD = 0.46$ ). Means for the other classes ranges from 1.89 (Class 7) to 2.05 (Class 6). Once again, although the mean content with weight value for Class 2 was slightly greater than the threshold for “low” ( $M = 2.68$ ), when I included Class 2 along with Class 1 as being low in both content with weight and content with weight management resources, the results remained significant ( $F(1, 835) = 81.28$ ,  $p < .001$ ).

#### **The association between mindset class and social norms for unhealthy eating.**

The hypothesis that individuals in mindset classes characterized by being “low” in both 1) content with weight and 2) content with weight-management resources (i.e. Class 1) will report stronger norms for unhealthy eating than individuals in all of the other mindset classes was supported ( $F(1, 835) = 8.70$ ,  $p < 0.01$ ). Specifically, the mean for Class 1 ( $M = 2.76$ ,  $SD = 0.68$ ) was significantly greater than the mean for all other classes ( $M = 2.57$ ,  $SD = 0.62$ ).

**Exploratory analysis.** Further analysis of means across classes (see Table 31) revealed that individuals in Class 2 ( $M = 3.02$ ,  $SD = 0.54$ ) and Class 1 ( $M = 2.76$ ,  $SD = 0.68$ ) reported the strongest social norms for unhealthy eating. Means for the other classes ranges from 2.45 (Class 7) to 2.62 (Class 4). Once again, although the mean content with weight value for Class 2 was slightly greater than the threshold for “low” ( $M$

= 2.68), when I included Class 2 along with Class 1 as being low in both content with weight and content with weight management resources, the results remained significant ( $F(1, 835) = 8.96, p < .001$ ).

**The association between mindset class and attitudes toward obese persons.**

The hypothesis that individuals in mindset classes characterized by being “high” in both 1) the belief that weight is changeable and 2) that one can increase their access to the weight management resources they need (i.e., Class 6, Class 7, Class 8 ) will report stronger negative attitudes toward obese persons than individuals in all of the other mindset classes was not supported ( $F(1, 829) = 83.42, p < 0.001$ ) In fact, the combined mean for Class 6, Class 7, and Class 8 was significantly lower ( $M = 2.99, SD = 0.68$ ) than the combined mean for all other classes ( $M = 3.23, SD = 0.66$ ).

**Exploratory analysis.** Further analysis of means across classes (see Table 31) revealed that individuals in Class 1 most strongly endorsed negative attitudes toward obese persons ( $M = 3.66, SD = 0.69$ ), whereas the means for all other classes ranged from 2.88 (Class 8) to 3.20 (Class 5). This may indicate that there is some relation between negative attitudes toward obese persons and being discontent with one’s own weight despite being classified as normal weight.

**The association between mindset class and social physique anxiety.** The hypothesis that individuals in mindset classes characterized by being “low” in both 1) content with weight and 2) the belief that weight is changeable (i.e., Class 1) will report higher levels of social physique anxiety than individuals in all of the other mindset classes was supported ( $F(1, 829) = 80.68, p < 0.001$ ). Specifically, the mean for Class 1



was significantly higher ( $M = 2.76$ ,  $SD = 0.61$ ) than the combined mean for all other classes ( $M = 2.43$ ,  $SD = 0.88$ ).

**Exploratory analysis.** Further analysis of means across classes (see Table 31) revealed that individuals in Class 2 reported the highest levels of social physique anxiety ( $M = 3.35$ ,  $SD = 0.67$ ), and individuals in Class 7 ( $M = 1.56$ ,  $SD = 0.70$ ), Class 8 ( $M = 1.75$ ,  $SD = 0.63$ ), and Class 5 ( $M = 2.00$ ,  $SD = 0.84$ ) reported the lowest levels of social physique anxiety. The means for all other classes ranged from 2.30 (Class 3) to 3.05 (Class 4). This pattern indicates that the hypothesized combination of beliefs is not actually associated with the highest social physique anxiety. It is potentially notable however that the opposite poles of the hypothesized beliefs (i.e. “high” content with weight and “high” weight is changeable) was associated with the lowest levels of social physique anxiety.

**The association between mindset class and weight bias internalization.** The hypothesis that individuals in mindset classes characterized by being “low” in 1) content with weight, but “high” in 2) the belief that weight is changeable (i.e., Class 4 and Class 6) will report higher levels of weight bias internalization than individuals in all of the other mindset classes was supported ( $F(1, 820) = 205.20$ ,  $p < 0.001$ ). Specifically, the combined mean for Class 4 and Class 6 was significantly higher ( $M = 4.04$ ,  $SD = 1.36$ ) than the combined mean for all other classes ( $M = 2.95$ ,  $SD = 1.48$ ).

**Exploratory analysis.** Further analysis of means across classes (see Table 31) revealed that individuals in Class 1 reported the highest levels of weight bias internalization ( $M = 4.67$ ,  $SD = 0.91$ ) followed by Class 4 ( $M = 4.32$ ,  $SD = 1.23$ ) and Class 2 ( $M = 4.61$ ,  $SD = 1.25$ ), and Class 6 ( $M = 3.70$ ,  $SD = 1.43$ ). Class 2, Class 4, and

Class 6 are all characterized by “low” endorsement of the content with weight subscale and moderate or “high” endorsement of the weight is changeable subscale. This indicates that although individuals in Class 1 have the strongest weight bias internalization, the hypothesized combination of beliefs is associated with increase weight bias internalization.

**The association between mindset class and implicit theories of weight.** The hypothesis that individuals in mindset classes characterized by being “high” in the belief that weight is changeable will report a stronger incremental mindset than individuals in all of the other mindset classes was supported ( $F(1, 816) = 438.17, p < 0.001$ ). The combined mean for Class 4, Class 5, Class 6, Class 7, and Class 8 ( $M = 4.53, SD = 0.78$ ) was greater than the combined mean for the other three classes ( $M = 3.37, SD = 0.82$ ).

The hypothesis that individuals in mindset classes characterized by being “low” in the beliefs that weight is changeable will report weaker incremental beliefs than individuals in all of the other mindset classes was also supported ( $F(1, 816) = 197.82, p < 0.001$ ). The mean for Class 1 ( $M = 3.16, SD = 0.80$ ) was higher than the combined mean for all other classes ( $M = 4.27, SD = 0.90$ ).

**Exploratory analysis.** Further analysis of means across classes (see Table 31) revealed that means across classes for implicit theories of weight scores were ordered relatively similarly to the weight is changeable subscale. However, mean implicit theories of weight scores across classes ranged from 3.16 (Class 1) to 3.99 (Class 7), whereas mean scores across classes on the weight is changeable subscale ranged from 2.30 (Class 1) to 5.81 (Class 7). This is evidence that the two scales are conceptually similar, but

scores on the weight is changeable subscale seem to increase differentiation in endorsement compared to the traditional measure of weight mindset.

**The association between mindset class and body mass index.** The hypothesis that individuals in mindset classes characterized by being “high” in 1) content with weight, 2) content with weight management resources, and 3) the belief that weight is changeable (i.e., Class 7 and Class 8) will have a lower BMI than individuals in all of the other mindset classes was supported ( $F(1, 805) = 33.45, p < 0.001$ ). Specifically, the combined mean for Class 7 and Class 8 ( $M = 23.98, SD = 4.35$ ) was lower than the combined mean for all other classes ( $M = 27.58, SD = 9.12$ ).

The hypothesis that individuals in mindset classes characterized by being “low” in 1) content with weight, 2) content with weight management resources, and 3) the belief that weight is changeable (i.e., Class 1) will have a higher BMI than individuals in all of the other mindset classes was not supported ( $F(1, 805) = 5.87, p < 0.05$ ). Specifically, the mean for Class 1 ( $M = 24.86, SD = 12.55$ ) was lower than the combined mean for all other classes ( $M = 26.87, SD = 7.55$ ).

**Exploratory analysis.** Further analysis of means across classes (see Table 31) revealed that, on average, individuals in Class 2 ( $M = 33.38, SD = 9.04$ ) and Class 4 ( $M = 30.08, SD = 8.80$ ) reported the highest BMIs, both of which would be categorized as obese. In addition, individuals in Class 6 reported a mean BMI that would be classified as overweight ( $M = 27.97, SD = 5.68$ ). The mean BMI for Class 1, Class 5, Class 7, and Class 8 all fell within the normal range ( $M = 23.14$  to  $M = 24.86$ ), and the mean for Class 3 ( $M = 25.22, SD = 8.01$ ) only marginally surpassed the normal weight BMI threshold of 25.00 suggesting that the initial hypothesis that being “high” in 1) content with weight,

2) content with weight management resources, and 3) the belief that weight is changeable is not the only pattern of beliefs that results in individuals successfully managing their weight.

**The association between mindset class and weight rebound.** Given the skewed distribution for weight rebound and the presence of weight rebounds that seemed nearly impossible (e.g. -960, 255), only those with weight rebounds between 0 pounds and 100 pounds were included in the analyses, the 95<sup>th</sup> percentile in the distribution of weight rebound ( $N=726$ ). The hypothesis that individuals in mindset classes characterized by being “low” in 1) content with weight and 2) the belief that weight is changeable (i.e., Class 4 and Class 6) will report higher levels of weight rebound than individuals in all of the other mindset classes was supported ( $F(1, 811) = 21.03, p < 0.001$ ) Specifically, the combined mean for Class 4 and Class 6 was significantly higher ( $M = 35.65, SD = 23.66$ ) than the combined mean for all other classes ( $M = 23.08, SD = 19.32$ ).

**Exploratory analysis.** Further analysis of means across classes (see Table 31) revealed that individuals in Class 4 reported the highest weight rebound ( $M = 37.40, SD = 24.41$ ) followed by Class 2 ( $M = 36.25, SD = 25.52$ ) Class 6 ( $M = 33.60, SD = 22.67$ ) and Class 1 ( $M = 31.71, SD = 23.27$ ), whereas the means for all other classes ranged from 13.47 (Class 7) to 25.17 (Class 3).

**The association between mindset class and weight suppression.** Similar to weight rebound, given the skewed distribution for weight suppression and the presence of weight fluctuations that seemed nearly impossible (e.g. -470, 300), only those with weight suppression between 0 pounds and 100 pounds were included in the analyses ( $N=692$ ; 85% of the sample of participants who reported on this variable). The hypothesis

that individuals in mindset classes characterized by being “low” in 1) content with weight and 2) the belief that weight is changeable (i.e., Class 4 and Class 6) will report higher levels of weight suppression than individuals in all of the other mindset classes was supported ( $F(1, 809) = 7.10, p < 0.01$ ). Specifically, the combined mean for Class 4 and Class 6 was significantly higher ( $M = 23.13, SD = 19.21$ ) than the combined mean for all other classes ( $M = 21.23, SD = 17.88$ ).

**Exploratory analysis.** Further analysis of means across classes (see Table 31) revealed that there was little variation in weight suppression across groups. On average, individuals in Class 5 reported the lowest mean weight suppression was ( $M = 17.58, SD = 15.32$ ), and individuals in Class 6 reported the highest weight suppression ( $M = 24.31, SD = 19.69$ ).

**The association between mindset class and current dieting status.** The hypothesis that individuals in mindset classes characterized by being “low” in 1) content with weight and 2) the belief that weight is changeable (i.e. Class 1) will be more likely to report that they are currently on a diet than individuals in all of the other mindset classes was supported ( $\chi^2(1) = 17.45, p < 0.001$ ). Specifically, 48% of individuals in Class 1 reported that they were currently on a diet, whereas this was true for only 28% of individuals in all other classes.

**Exploratory analysis.** Further analysis of means across classes (see Table 31) revealed that individuals in Class 1 (48%) and Class 6 (42%) were most likely to report that they were currently on a diet. Percentages in all other classes ranged from 16% (Class 8) to 32% (Class 4).

**Gender breakdown across mindset classes.** The relationship between gender and weight mindset was significant ( $X^2(21) = 61.58, p < 0.001$ ). Overall, men made up 40.40% of the sample ( $n=347$ ), women made of 54.25%, 0.35% selected not listed, and 5.01% chose not to respond. Therefore, classes for which the male to female ratio is furthest from this may identify sets of beliefs uniquely likely to be held by men or by women. Class 2 was the class that most diverged from this male to female ratio. Men made up only 15% of this class. The male to female ratio for Class 4 (29% Male, 71% Female), Class 5 (35% Male, 65% Female), and Class 6 (38% Male, 60% Female), and Class 3 (50% Male, 50% Female) were relatively close to the overall ratio. Class 1 (60% Male, 38% Female), however, was relatively overrepresented by men. Class 1 and Class 2 were notable in that individuals in these classes had among the lowest scores for the content with weight subscale. However, the mean BMI among those in Class 1 would be classified as normal ( $M = 24.86$ ) whereas the mean BMI among those in Class 2 is the highest among all classes and would be classified as obese ( $M = 33.38$ ).

## Study 2 Discussion

The primary aim of Study 2 was to examine differences across weight mindset classes in individuals' health and weight related behaviors and beliefs. Specifically, LPA was conducted on the WARM, developed and validated in Study 1. The LPA, a means by which to examine the number of different weight mindsets that can be empirically derived using the WARM, suggested that there are 8 weight mindsets, far more than the two suggested with measures used in prior studies (Burnette, 2010). Previous measures of weight mindset only allow researchers to categorize individuals based on whether they believe weight is changeable or not changeable (e.g. Burnette, 2010, Ehrlinger et al.,

2017). Results from Study 2 suggest that the WARM provides superior predictive value in terms of a variety of health and weight related outcomes when compared to what can be concluded by examining differences across only incremental and entity mindsets. For example, past researchers have suggested that an incremental mindset should be beneficial in terms of weight management (e.g. Burnette, 2010) despite the mixed evidence that this is the case (e.g. Burnette & Finkel, 2012; Auster-Gussman & Rothman, 2018). The use of the WARM-generated mindset classes reveals that the belief that weight is changeable is not related to BMI, and in fact that individuals with relative strong endorsement of both the weight is changeable subscale and implicit theories of weight (e.g. Class 4, Class 6) simultaneously have mean BMIs that would classify them as overweight or obese and among the highest mean scores for weight rebound indicating the presence of at least one failed weight loss attempt or uncontrolled weight gain over time. These two classes also have among the lowest scores on the content with weight subscale. Taken together, it is clear that incremental or weight is changeable beliefs alone are not enough to predict positive weight management outcomes.

The patterns of endorsement of the four subscales across different mindsets also provide evidence that whether one believes weight is changeable is relatively independent of whether one is content with their current weight, weight management resources, or whether they believe they can increase their access to weight management resources. Specifically, the four subscales of the WARM allow researchers to better understand whether individuals' weight-related change beliefs are about their capacity to manage their weight by accessing the resources needed to do so or specifically about weight. In addition, prior weight mindset measures included no assessment of the extent

to which an individual is content with their current state in terms of their weight or ability to manage their weight, which prior research suggests plays a role in the manner in which change beliefs effect health behavior (Ommundsen, 2001).

One of the issues with categorizing individuals using traditional measures of implicit theories of weight is that most individuals are categorized as having the mindset that weight is changeable (e.g. Auster-Gussman & Rothman, 2018). In this study, using the traditional scoring, 52.67% of individuals would be classified as having an incremental mindset and 10.80% as having an entity mindset. Proportions of individuals across the 8 weight mindsets identified in this study reveal that the use of the WARM as a means to categorize individuals leads to many more distinctions and that there is no single class to which a majority of individuals were classified. Specifically, only 20.5% of individuals were assigned to the largest class and 2.2% and 4.0% of individuals were assigned to the two smallest classes. In addition, the propensity scores were high among all eight classes suggesting that the individuals in each class have beliefs well represented by the mean levels for each class.

The results from Study 2 suggest that many weight-related health behaviors and outcomes differ based not simply on whether individuals believe weight is changeable or not but are instead related to mindsets characterized by specific combinations of beliefs (e.g. “low” content with weight, and “high” weight is changeable). For example, the traditional implicit theories approach would suggest that those with stronger beliefs that weight is changeable would exercise more than those with weaker incremental beliefs. However, the results of Study 2 suggest this is not the case. For example, people in Class 1 and Class 7 reported the most exercise per week, yet people in Class 1 reported the



lowest average score on the weight is changeable subscale whereas people in Class 7 reported the highest score on this subscale. People in Class 4 reported the least exercise per week and yet had an average endorsement of nearly five on a six point scale for the weight is changeable subscale. Moreover, an examination of implicit theories of weight scores across classes reveals that the total range was less than one point, suggesting that the weight is changeable subscale of the WARM, a self-relevant measure of the extent to which an individual believes their weight is changeable, is more predictive of individual's weight-related behaviors and beliefs than are the more general beliefs about weight changeability.

The traditional implicit theories approach would also suggest that those with the strongest incremental beliefs should have the lowest BMI and those with weaker incremental beliefs should have higher BMIs (e.g. Burnette & Finkel, 2012). Examination of differences across classes again reveal that this is not the case. Although the pattern of beliefs held by people in Class 5, Class 7 and Class 8 indicate that people who report a strong belief that weight is changeable also have lower mean BMIs, the reverse pattern is true for people in Class 1 and Class 4. Specifically, those in Class 1 report the weakest belief that weight is changeable and a mean BMI of less than 25, which would classify their weight as normal on average, whereas people in Class 4 report among the strongest beliefs that weight is changeable, but have a mean BMI greater than 30, which would classify them as obese. This pattern of results suggests that examining the belief that weight is changeable is not alone enough to predict BMI.

Given the number of findings presented in Study 2, the following discussion will summarize findings within and across classes with the goal of beginning to create a sense

of the type of weight related behaviors and attitudes that characterize each class. These are initial summaries based on the quantitative results of Study 2<sup>3</sup>. For ease of interpretation, I will discuss the classes in order from most content with weight to least content with weight. Specifically, the four classes who reported that they were mostly content with their weight (Classes 7, 8, 5, and 3) will be discussed first and then used as comparison for consideration of those classes with the lowest scores on the content with weight subscale.

**Weight Mindset Classes Summary: High Content with Weight** First, those in Class 7 and Class 8, who highly endorsed all four subscales of the WARM, seem to be mostly similar across all the outcomes. Individuals in Class 7 exhibited slightly more healthy behavior (i.e. fruit and vegetable consumption and exercise) and slightly less unhealthy behavior (i.e. sugar-sweetened beverage consumption and eating away from home) than Class 8, but the two groups were otherwise similar. Class 5 was similar to Class 7 and 8 except for their “low” endorsement of increased access to weight management resources and moderate endorsement of being content with their current weight. Given their “low” endorsement of the increase access to weight management resources subscale, it is not surprising, perhaps, that individuals in Class 5 report a slightly higher consumption of sugar-sweetened beverages and lower perceived neighborhood safety and food environment, indicating that their environment may be one primary reason that they do not believe they can increase their access to weight management resources. They also had higher weight bias internalization than those in

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<sup>3</sup> Elaborated descriptions of each class including descriptive labels for each weight mindset will be presented in the Study 2 and 3 integration analysis following Study 3.

Class 7 and Class 8 despite having nearly the same BMI which is likely related to their weaker endorsement of the content with weight subscale.

The main difference between individuals in Class 3 to those in Classes 7 and 8 in terms of their endorsement on the four subscales of the WARM is that those in Class 3 more weakly endorse the subscales with mean scores ranging from 3.51 to 3.84 on each subscale, less than the mean scores for Class 8 (4.51 to 5.27) or Class 7 (5.31 to 5.84). Across a number of outcome variables, compared to those in Class 7 and Class 8, those in Class 3 report slightly more negative attitudes and behavior. Specifically, they reported higher consumption of sugar-sweetened beverages and frequency of eating away from home. They also more strongly endorsed that they eat for reasons other than hunger and experience loss of control over eating. They reported lower neighborhood safety and food environment and higher social physique anxiety and weight bias internalization. Of note, individuals in Class 3 had a mean implicit theories of weight score of 3.40. If they were evaluated using the traditional classifications for implicit theories of weight which categorizes those with a score above 4.0 as incremental and those with a score below 3.0 entity, these individuals would be considered to have neutral beliefs, and in some samples, would be removed entirely (Dweck, 1995).

### **Weight Mindset Classes Summary: Low Content with Weight**

In terms of endorsement of the WARM subscales, individuals in Class 6 were similar to those in Class 7 and Class 8 except that those in Class 6 were not content with their weight. The most notable difference on the outcome variables between those in Class 6 and individuals in the other mindsets low on the content with weight subscale (i.e. Class 6, Class 1, Class 2, and Class 4), was that those in Class 6 reported the lowest

frequency of eating for reasons other than hunger and loss of control over eating. This pattern of results could suggest when individuals are not content with their weight, having access to weight management resources buffers against maladaptive or emotional eating behaviors (i.e. palatable eating motives and loss of control over eating) as Class 6 is the only class among those low on the content with weight subscale who are also high on the content with weight management resources subscale. already described.

Individuals in Class 4 were similar to those in Class 6 in that they were both low on the content with weight subscale and high on the weight is changeable subscale. However, those in Class 4 reported less access to weight management resources and lower perceived ability to increase their access to weight management resources compared to those in Class 6. Those in Class 4 were among the three classes (i.e. Class 4, Class 1, and Class 2) that most strongly endorsed the maladaptive eating scales and weight bias internalization scales. This may be further evidence that when individuals are not content with their weight, the perception that one is content with their access to weight management resources buffers against maladaptive eating, or conversely, the not being content with one's resources is related to increased maladaptive eating behavior and weight bias internalization. Perhaps, individuals feel stuck at their current weight, regardless of their actual beliefs about weight changeability. Furthermore, those in Class 4 and Class 6 also report the lowest levels of exercise and fruit and vegetable consumption among all classes. From the traditional implicit theories' perspective, this should be surprising given individuals in this class reported the second highest mean score on the weight is changeable subscale. However, this could reflect the propensity of those who perceive weight to be changeable to become stressed when they are not able to

succeed despite effort (Niiya et al., 2010), and in this case, perhaps disengage with health goals.

Class 1 was similar to Class 4 and 6 in terms of the content with weight subscale and the increase access to weight management resources subscale but had the lowest endorsement of the weight is changeable and content with resources subscales. In line with the theorizing above, these individuals more strongly endorsed that they eat for reasons other than hunger, experience loss of control over eating, and had the highest weight bias internalization. They also reported the lowest scores for neighborhood safety and the most overweight individuals in their social network, evidence that their strong belief that weight is not changeable may result from their environment and social environment rather than from a belief that weight is inherent or biological, a reason often cited in the literature as a reason for the belief that weight is fixed (e.g. Burnette et al., 2017). Furthermore, these individuals also had the most negative attitudes toward obese persons. This is in line with past research suggesting that an entity mindset is associated with increased body shame and more anti-fat attitudes via the attribution that one cannot change their weight in the future (Burnette et al, 2017). This is especially interesting given that mean BMI in this group falls within the normal range despite the very low endorsement of being content with their weight. It was also the class that the highest male to female ratio.

Those in Class 2 were the least content with their weight and the least content with their access to weight management resources other than those Class 1 and low endorsement of the can increase access to weight management resources subscale. They had moderate endorsement of the weight is changeable subscale. Given their endorsement

of the content with weight and content with weight management resources subscales, it should not be surprising that Class 2 had the second highest endorsement of eating for reasons other than hunger, loss of control over eating, and weight bias internalization. Although their endorsement of the weight is changeable subscale was only moderate, it did fall in the upper half of the scale, which would be classified as an incremental belief. Similar to those in Class 4 and Class 6, these individuals may have begun to give up on healthy behaviors as their weight did not change despite effort as past research suggests that incremental mindsets do not buffer against repeated failure (e.g. Niiya et al., 2010). Given that they have reported the highest weight rebound, they may have even begun to develop more entity beliefs over time as they experience continued weight management failures. They may also perceive weight management to be particularly difficult given their current physical and social environment as they reported among the lowest scores the most negative (i.e. little access to health food) perceived food environment as well as high social norms for unhealthy eating.

### **Weight Mindset Classes Summary**

The summaries above were a first step to better understanding the relation between mindset class and weight related attitudes and behaviors. Patterns began to emerge that suggest that knowing whether an individual believes weight is changeable or fixed is not adequate to understand and predict that individual's weight-related attitudes and behaviors. For example, a pattern began to emerge suggesting that the combination of not being content with one's weight nor weight management resources is associated with both maladaptive eating behaviors and weight bias internalization. Furthermore, the belief that weight is changeable was primarily associated with increased positive health

behavior decreased unhealthy behavior only when individuals were content with their access to weight management resources, suggesting the need to better understand individuals; perception of the outside pressures such as time or finances that affect individuals' ability to manage their weight.

## **Study 2 Limitations**

The primary limitation of Study 2 was that the hypotheses were based on endorsement of the four factors captured by the WARM12 rather than about specific classes. This meant that some hypotheses were difficult to interpret as the categories that were considered together may not have been the most appropriate if the 8 classes had been known prior to generation of the hypotheses. In addition, given the fact that this is the first study to examine the WARM as a tool for not only delineating weight mindset classes, but also using these classes to describe individuals' weight related beliefs and behavior, this study can only offer preliminary conclusions. The relations between variables and the nature of any specific differences between classes should not be considered confirmatory, but rather as a starting point for future investigations. However, the mean posterior probabilities of individuals' likelihood of being in the class to which they were empirically assigned were generally very high (i.e., >90%), which increases confidence in these results. Furthermore, given the number of statistical tests and comparisons conducted in this study, there is some risk for Type II error. Furthermore, given the scope of this analysis, gender was not examined as a central variable. However, it is possible that gender plays a role in the relation between weight mindset and these outcomes and is an important subject for future investigation.

Another limitation of Study 2 is that although there is evidence to suggest that the 8-class model is a good fit to the data, this is based on one large sample. The 8-class model may be oversaturated and these classes, although generally replicated with a slightly smaller sample in Study 1, may not be replicable across samples, especially in cases in which the sample size is constrained to be much smaller than the more than 800 individuals included in analysis in this study.

Furthermore, although these classes were relatively stable across Study 1 and Study 2, these were independent samples and are not indicative of individual stability over time. In other words, although it is expected that with a large enough sample size, these eight classes could be identified in a given sample, a given individual might shift mindsets over time, especially if they are actively trying to manage their weight and therefore experiencing either success or failure in this endeavor. For example, it would be expected that individuals would shift classes as they moved from being not content with their weight to being content with their weight during purposeful weight management efforts. These classes represent types at a given moment in time rather than stable characteristics of individuals.

The results provide a first step toward a better understanding of the constellation of weight-related beliefs that are related to each weight mindset as well as the patterns of weight-management and health behaviors in which individuals with each mindset engage. The most important finding from Study 2 is the identification of 8 classes as the best fit to the WARM, as the classes are the basis of the argument that the WARM affords better prediction of health and weight-related behaviors and outcomes compared to focusing on the distinction between incremental versus entity mindsets afforded by the traditional



approach to implicit theories of weight. Although this quantitative study was a first step to understanding the weight-related attitudes and behaviors of individuals in each of these eight classes, a richer evidence base is needed to begin to gain a better understanding of individuals in each class, giving rise to clear and convincing descriptions and labels that can inform future research.

### **Study 3: In-Depth Interviews of Individuals with Each of the Eight Weight Mindsets**

The primary aim of Study 3 to gain a richer understanding of weight mindset from a process orientation. This includes the beliefs that underlie each of the four WARM subscales, individuals' beliefs about how their weight mindset developed, how their weight mindset affects their everyday life and social interactions and the breadth of weight-related wishes and plans that individuals have for the future. Study 1 and 2 provided evidence of the stability of the empirical derivation of the eight mindsets across two samples as well as preliminary assessments of differences in individuals' health behavior and associated weight and health beliefs across these mindsets. Study 3 was a qualitative study, part two of the explanatory sequential design. It was designed to provide initial insights into the histories and general weight-related experiences and beliefs of individuals across weight mindsets, and it did so through long-form interviews with up to two men and two women in each of the eight mindset classes. These findings were then integrated with the Study 2 findings to generate descriptions and labels for each weight mindset.

There are a variety of reasons for the explanatory-sequential approach. First, theory related to the study of weight management mindsets is not nascent, but it is by no means a mature theory. Mature theory represents established constructs and models, whereas

nascent theory asks novel questions for which little or no past research exists. Although provisional explanations for weight mindset related phenomena are slowly mounting, research in this area is only 10 years old, with each paper presenting new constructs and relations without a great understanding of the mechanisms underlying these relations. Clarity about the relations between weight mindsets and more established constructs is needed.

Specifically, weight management mindset research seems to suffer from narrow theoretical articulations and somewhat weak conceptual articulations that lessen its potential contribution to the weight management literature. Specifically, weight mindset theory only included individuals' beliefs about whether weight is changeable, and the specific beliefs underlying this belief were not conceptually articulated. Study 2 provided evidence that an approach to implicit theories of weight research that rests on the single distinction between incremental and entity beliefs is ill-equipped to capture the complexity of people's weight management beliefs. Furthermore, much of the research on weight management mindsets is predicated on the idea that people with certain mindsets think differently than people with other mindsets. However, it is not clear whether these mindsets are a product of individual differences, life events, and factors that predate one's first weight management goal, or if they resulted from the very experience of trying and subsequently succeeding or failing at losing weight, or alternatively, paying no attention to one's weight.

Qualitative research methods are a means of understanding a phenomenon from the perspective of those who are experiencing it, so that one might better understand how those individuals think about their world (Creswell, 2013). The goal of these in-depth

interviews was to both better understand how individuals typically perceive their weight mindset as having developed, and to be attentive to idiosyncratic differences in these perceptions. These interviews employed questions aimed at gaining better understanding of the origin of individuals' weight management mindsets as well as the processes related to consistency or change in their mindset over time. This is a first step to better understanding the interactions between individual's histories, environment, cognition, and weight-management related behavior. The goal was to begin to develop a framework for how, when, and why weight management mindsets develop and transform, and how, when, and why these mindsets come to influence health behavior. The specific research questions examined in this study are presented below and descriptions of analyses related to these particular questions are in the analysis section.

*Research Question 1. What are the individual beliefs underlying people's weight mindsets?* Inquiries in this part of the interview were aimed at gaining a better understanding of the beliefs that underlie people's responses to the four subscales of the WARM. These questions relate to why the participant holds the beliefs that they do. For example, why are they content with their weight, or why do they believe weight is changeable?

*Research Question 2: What are individual's perceptions of the influences on the development of their mindset?* This research question was related to whether and how individuals' weight history led to their current belief about weight as well as who or what they believe has contributed most to their current beliefs about weight.

*Research Question 3. How much does weight affect people's thoughts and interactions?* This research question is related to how much weight affects people during

their everyday lives and interactions. This includes whether and how people are affected by thoughts about their weight as well as whether and how weight is something that is talked about among their close family and friends. Finally, I was also interested in whether they believe their weight affects their social interactions and choices to engage or not engage in social behavior.<sup>4</sup>

*Research Questions 4: What do people wish they could change about their weight and health habits both now and in future?* These questions were aimed at getting a sense of whether people had future weight loss or weight management plans in place as well as getting a sense for how truly content they are with their current health habits as they relate to weight.

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<sup>4</sup> Other questions were asked during the interview but were not examined for these analyses (see Appendix K).

## Study 3 Methods

### Design and Overview

All hypotheses and materials were preregistered on the Open Science Framework (<https://osf.io/>). Semi-structured interviews provide a relaxed and open environment that allows for access to and explanations from participants that are specific, but less structured and potentially less threatening than a formal interview (Barriball & While, 1994; Tashakkori & Teddlie, 2003). They also allow researchers to probe certain topics that are not easily observed using quantitative methods and to discuss issues and topics in a responsive and appropriate way (Creswell, 2013; Creswell & Plano Clark, 2007). The questions for the semi-structured interview were guided by insights from Study 2 (Barriball & While, 1994; Tashakkori & Teddlie, 2003) and also include questions necessary to the understanding of development of weight mindsets and resultant health behaviors.

**Validity and reliability of interview data.** Semi-structured interviews provide high validity as they allow the participant to talk in detail and explain meaning behind their cognitions, emotions, and behaviors with little to no input from the researcher (Glesne, 2011; Tashakkori & Teddlie, 2003). Although the researcher has no way of knowing the extent to which the participant is telling the truth, this is true of any study, qualitative or quantitative. There is always a chance that a participant has consciously or unconsciously responded untruthfully. Hindsight can also play a role in semi-structured interviews, whereby the participants have had the opportunity to reflect on their past thoughts and behaviors and rationalize or sensationalize them (Glesne, 2011; Tashakkori & Teddlie, 2003). However, to the extent that the participant is relaying this information

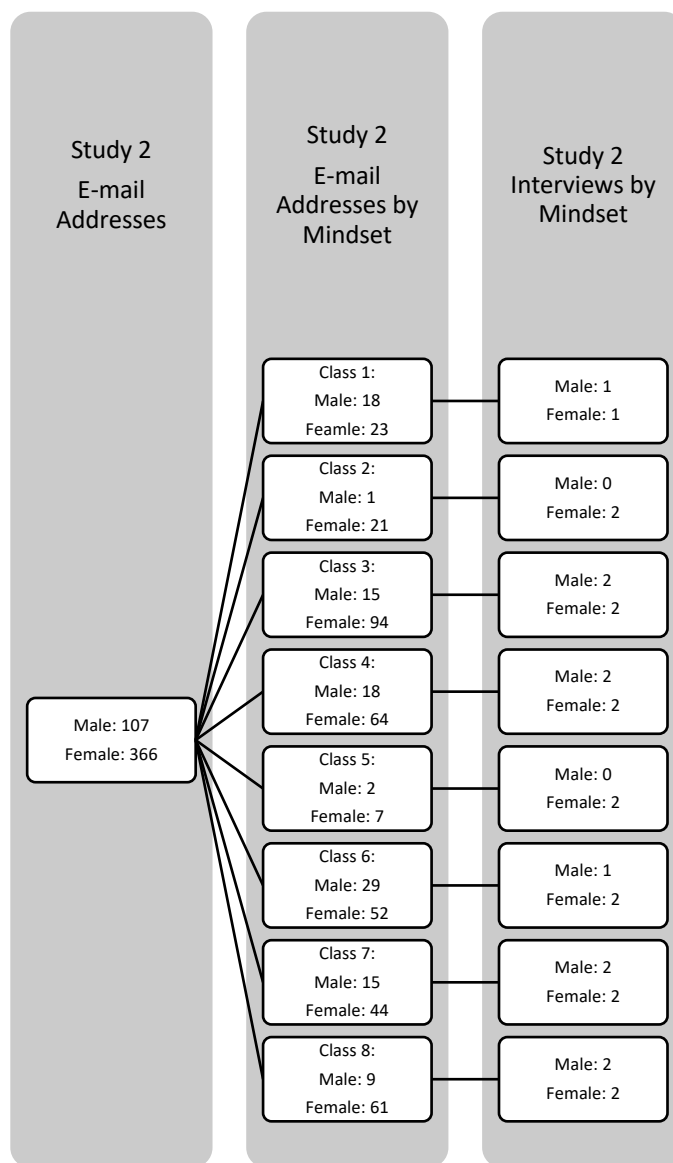
in a manner than they believe is truthful, it is their truth and the truth that has guided their subsequent beliefs and behavior and is therefore useful and important.

### **Participant Selection and Recruitment**

In mixed method sequential designs, data collection is dependent, rather than independent. Although it is important for sequential designs to use the same participants in both phases of the research, generally the sample size for the quantitative study is much larger than that of the qualitative study (Creswell & Plano Clark, 2007; Onwuegbuzie & Collins, 2007; Tashakkori & Teddlie, 2003). Creswell and Plano Clark (2007) suggest that the most important aspect of the qualitative study sample is that it is 1) selected from the quantitative sample and 2) that the sample is selected to provide the detail needed to explain the quantitative results.

Therefore, the participants in this study were individuals selected from the pool of participants who agreed to leave their e-mail address for further contact in Study 2 (N=473; see Figure 6). After these participants were identified, they were classified by weight mindset class and gender, creating 16 groups. Participants were then ordered in terms of the posterior probability of being in their primary class, an output from latent profile analysis that represents the likelihood that an individual should be classified into one class versus another. An “exemplar” score was then calculated for each participant. This exemplar score was the sum of the absolute value of the differences between each participant’s score on each subscale and the mean score for that class. For example, a participant in Class 1 with mean subscale scores of 2.00, 2.32, 2.37, and 4.74 would have an “exemplar” score of .16 ((abs(2.00- 1.98)) + (abs(2.32 – 2.30) + abs (2.37-2.39) + abs (4.74-7.84) = 0.16). Participants were then divided between those with a posterior class

probability score greater than 0.995, indicating 99.5% likelihood that the given class was the class to which they belonged, and those with a score less than this. They were then ordered within each group in terms of their exemplar score. This meant that a participant with a high propensity score could have a larger exemplar score than one with a lower propensity score, indicating more divergence from the subscale means in that class. I decided to use these two parameters to order potential interviewees as the ideal participant is one that is the closest to an exemplar of a given mindset (as indicated by their propensity score) and who is a typical case (as measured by their mean scores on each of the subscales).

Figure 6. *Possible contacts and interviewees by weight mindset*

**Recruitment procedure.** After participants were rank ordered using these parameters, they were contacted five at a time from each of the 16 groupings. An e-mail with the subject line “Weight and Health Study Follow-up Interview” was sent to remind them of the survey they taken and that they had indicated they were willing to be contacted about a follow-up study. This e-mail included a link to a scheduling doodle poll



(<https://www.doodle.com>). Participants were asked to indicate they were interested by filling out their availability on the doodle poll and told that they would be contacted with a confirmed interview date and time. If they entered their availability in the doodle poll and the interview was more than 24 hours in the future, they were sent a confirmation e-mail indicating they would be sent more information 24 hours before the scheduled interview time. At that point, they were sent an interview reminder e-mail with a link to the consent form hosted on Qualtrics as well as a link with information about how to download Zoom, (<https://zoom.us>) a secure phone platform, if they chose to use the web application, as well as a call-in number similar to a conference call if they wanted to call in from their phone. If the interview was within 24 hours, a confirmation email with the embedded links was sent. If they did not fill out the doodle poll, they were sent a follow-up email 48 hours later. At that point, unless the two interview “slots” were filled, the original e-mail was sent to the next five individuals. This procedure was repeated until two men and two women from a given mindset class were interviewed or when the potential pool of participants for a given class ran out. When individuals did not call in at their scheduled time, they were sent one re-scheduling e-mail. If they responded within 24 hours they were rescheduled, otherwise they were replaced.

**Sample Justification.** The reason for choosing to include 32 interviewees, two men and two women from each of the eight mindset classes, resulted from several considerations. First, past research, as well as Study 2 here, have shown that men and women experience weight differently (e.g. Puhl & Brownell, 2006). In addition, interviewing two individuals of each gender within each weight mindset makes it possible to see whether responses converge. The added benefit of interviewing three

individuals of each gender with each weight mindset was determined to not outweigh the costs.

### **Study Procedure**

As noted, potential participants were contacted via e-mail to schedule an interview time. Scheduled participants consented via a consent form hosted on Qualtrics. At the scheduled interview time, they either called in via a secure line hosted through Zoom or called using the Zoom web application. Phone interviews were chosen to enable all participants from Study 2 to be eligible regardless of their geographic location, and it allowed the body weight of the interviewer to not affect participant responses.

***Phone Interview.*** The method of data collection was a long semi-structured interview conducted by the author (McCracken, 1988). Interviews started with an introduction that made it clear that this interview was for research purposes only and that my aim was not to diagnose or treat. At the beginning of the interview, participants were welcomed, informed of the general purpose and topics to be discussed, and the general guidelines of a semi-structured interview.

I then began the interview with questions about content of their weight-mindset related beliefs and gradually focused on eliciting more detailed responses to questions regarding how their beliefs have changed or developed over time (or not changed or developed) as well as questions about their weight history, how they set, monitor, and reach weight related goals, how they manage health behaviors. Each interview lasted approximately 30 minutes. Interviews were recorded and afterward transcribed verbatim. Participants were compensated \$15.

**Measures and Materials.** The interview questions used in Study 3 are described below. The full interview scripts can be found in Appendix K.

***Mindset specific weight beliefs questions.*** These questions are designed to examine specific beliefs directly related to the four subscales of the WARM. The purpose of these questions is to elaborate the descriptions of each weight mindset. Some example questions are “Have you always been content/not content with your weight?” and “Have you had personal experience with changing your weight?”.

***Weight management history.*** Participants were asked when they first started thinking about weight management or their body weight, if there were any specific memories or people attached to this, their thoughts and feelings about it, and whether they believe it has impacted their current weight management beliefs. They were also asked who or what has had the biggest impact on their current beliefs about weight management. These questions are aimed at capturing participants’ early experiences related to weight. The goal is to examine how these experiences relate to development of weight mindset in adulthood.

***Weight related thoughts and interactions.*** These questions were designed to get a sense of how much participants’ thoughts about weight affect them, a sense of whether and how weight is talked about among the participant’s family and friends as well as whether they believe that their weight affects their social life. Some example questions are, “How much do you think about your weight on a daily basis?” and “How often do your close friends and family talk about weight? What are these conversations about?”

***Health behavior ideals.*** This question asked participants whether they would change anything about their health habits if they had unlimited time and money, and if they had any future body weight-related plans or goals.

***Final Questions.*** The interviewer asked if there was anything else the interviewee wanted to share or believes might be important for the interviewer to know.

### **Study 3 Analysis Protocol**

First, all interviews were recorded via the Zoom local recording platform upon which recordings are saved to the computer desktop, but not to the Zoom cloud, to preserve the confidentiality of the data. These recordings were uploaded onto Box (<http://www.box.com>), a secure university-owned storage platform. There they could be accessed only by the research team. All interviews were conducted by the primary investigator and subsequently transcribed by research assistants. These transcripts were a verbatim account of all verbal and any audible non-verbal utterances. The goal was to retain as much information as possible in order to make interpretation as accurate as possible in terms of being true to the original verbal account. The primary investigator checked each of the interviews after they were transcribed.

### **Thematic Coding of the Interviews**

Analyses were conducted using thematic coding, which is a method of identifying, analyzing, and reporting themes and patterns within data (Braun & Clarke, 2006). Thematic analysis can be used for reporting participant's beliefs, experiences, and the meaning they carry as well as be used to examine relations between constructs (Braun & Clarke, 2006; Fereday & Muir-Cochrane, 2006). The choice to use thematic analysis lies in its flexibility and for its acceptability as an analytic method in psychology

(Roulston, 2001). Although it should be noted that it is widely used, some have noted that it is rarely acknowledged by name (see Braun & Clarke, 2006). Importantly, it is a process that can be used with a variety of analytic traditions and theoretical contexts.

The process used for thematic coding was:

Step 1: Open-coding was done to explore and capture both the themes and association between variables. The goal was to both identify constructs and to examine relations between variables. This step also includes writing memos about the meaning of the codes as they are generated.

Step 2: Codes were grouped together by looking for emerging patterns in the codes based on the research questions, including variability and consistency by both examining the codes and the related memos.

Step 3: Production of a reduced set of codes relevant to each research question.

Step 4: An interpretation of the codes.

### **Integration Analyses**

Analyses of mixed-methods designs includes analysis of both the quantitative and qualitative findings separately, but also the integration of findings from both phases of the design (Creswell & Plano Clark, 2007). In these analyses, the quantitative data were collected as a platform to inform the qualitative study as findings from Study 2 were used to examine whether additional questions or mindsets need to be examined in Study 3. In addition, the qualitative study enriched and explained the quantitative findings from Study 2. Therefore, the integration analysis highlights where findings from Study 2 and Study 3 lead to similar conclusions and where they diverge. This integration also allows

for a characterization of individuals within each weight mindset and resulted in the names and descriptions of each weight mindset.

### **Study 3 Results**

#### **Participant Characteristics**

The final sample consisted of 25 individuals, 40% of which were men ( $n = 10$ ), and 60% of the of which were women ( $n = 15$ ). The mean age of participants was 40.88 ( $SD = 11.89$ ). A majority of the sample ( $n = 23$ ) identified themselves as European/Caucasian American, 1 as Black/African American, and 1 as Latino/Hispanic American, which is similar to the overall profile Study 2 participants. Although the aim was to interview two men and two women with each of the eight mindsets, there were some classes for which this was not possible given the small number of individuals who shared their email addresses for some classes, as well as non-responses. Figure 6 displays the numbers of men and women interviewed in each class.

#### **Qualitative Findings**

The Study 3 findings will present the qualitative analysis of the combined responses for all classes together. The integration analysis, which follows the Study 3 discussion, will focus on how these findings differ based on weight mindset class.

#### **Research Question 1. What are the individual beliefs underlying people's weight mindsets?**

Qualitative analysis of responses related to whether one is content with their weight reveal great variation in the genesis of individuals' responses. Examination of individual responses revealed approximately 14 emergent themes (see Table 32). Those that were mentioned most as reasons that people were not content with their weight was

wishing that they could lose weight, that they were happier with their weight at another time in their life, that they didn't like how they feel, and the avoidance of health problems. Those who were content gave reasons such as having a healthy BMI, having recently lost weight, and how their clothing fits.

Qualitative responses related to whether one believes weight is changeable were also quite variable. Responses revealed 11 emergent themes (see Table 32). One of those most common reasons people believed that weight was changeable was because they had lost weight in the past or close others had lost weight in the past. Many also cited simple rules as the reason they believe weight is changeable such as it being just calories in/calories out, that it just takes willpower or discipline, or that they learned that it was changeable in a class or from a book. The reasons people believed that weight was less changeable fell into three categories. First, some people talked about their own specific limitations such as not being able to control cravings, having physical limitations, having no willpower, or their genetics. Others viewed it as a select few individuals who might have a rare disease or genetic disorder. The most common reason people gave for believing that weight was not changeable was age related; that it had become more difficult with age, that their metabolism is slower, or that the scale will no longer move despite healthier behavior.

Qualitative responses related to having access to resources varied from very specific to very broad. Responses revealed approximately 14 themes (see Table 32). Those who felt that they had access to most basic resources often described very specific weight-management resources such as having a life coach, personal trainer or nutritionist, access to specific programs such as weight watchers, the affordability of specific diets

such as low carb, or specific technology such as calorie tracking apps. Those with less access to resources tended to speak more broadly about access to gyms or roads with sidewalks, being in food deserts where the nearest grocery store is far away, or not having access to social support networks. A variety of participants also mentioned motivation as a primary resource that they were lacking.

Finally, qualitative responses related to increasing access to weight management resources fell into only a few categories (see Table 32). Those who believed they could get access to resources generally gave reasons such as being able to search for information on the internet, being able to prioritize time or finances, or stating that they have no need for special plans or resources to manage their weight. Those who did not believe they could increase their access to weight management resources gave reasons such as familial obligations, not being able to afford a specific thing they need (e.g. trainer, specific foods, exercise equipment), or simply that they are just not willing to put in the effort it would require to try to get more resources.



Table 32. *Themes for Research Question 1*

Content with Weight	
	<p>wish I could lose weight  happier with weight at another time  weight-related health issues/avoid them  BMI/numbers on the scale  my standards are high (not actually that fat)  how people treat me/ view me  clothing fit  post-baby weight never left  energy level/fitness/how I feel/ability to exercise  specific body parts (bad)  self-hatred/beliefs  just how I look/come to terms with my weight  authority told me I shouldn't be  because I lost weight</p>
Weight is Changeable	
	<p>used to think it was more changeable  willpower/craving control/discipline  physical injuries/limitations  weight loss is slower than it used to be/changes with age  much harder than people realize/scale won't move despite health behavior  genetic limitations/family history  I lost weight in the past  close-others lose weight in the past  yes, with special diet (e.g. low calorie, low carb, intermittent fasting)  not cookie cutter/varies between people  body for life/Weight Watchers programs/class</p>
Content with Resources	
	<p>specific programs (i.e. Weight Watchers, Jenny Craig)  gym membership/access  life coach/nutritionist  accountability person  physical limitations  rural/neighborhood issues (e.g. food/exercise access)  cost of healthy food  lacking social support  lacking knowledge (e.g. what to do in the gym, what to eat)  specific resources (e.g. calorie tracker, google)  lacking motivation as a resource  lacking time  don't need resources  home equipment</p>
Can Increase Resources	
	<p>don't need special "plans"  not enough financial resources  too far/no time  can't afford specific plan/trainer  always feasible (e.g. google, could prioritize)  not willing to/not feasible (e.g. children obligation)</p>

## **Research Questions 2: What are individual's perceptions of the influences on the development of their mindset?**

Qualitative responses revealed several themes in individual's perceptions of the timeline of and influences on the development of their mindset. First, participants' responses to when they first began thinking about their weight ranged from elementary school age to late 20s. The reasons that individuals began thinking about their weight varied greatly but fell into a few overarching categories: parent/family-related, peer-related, and event-related. Some examples of parent/family-related events were memories related to parents' dieting, parents' negative body-related self-talk, a parent calling them or their siblings overweight or fat, or even withholding food. The peer-related reasons included peers talking about weight and dieting, the individual being made fun of by peers, or that the individual became interested in new activities such as dating or sports that they believe made them aware of their body shape and size. Finally, the event-related reasons were memories of seeing a picture of themselves and realizing they were overweight, seeing the number on the scale, a sudden realization that they had slowly gained weight over time, or because of an impending event, such as a wedding.

When asked who or what had the greatest impact on their current beliefs about weight, participant's responses fell into several categories. Some individuals cited their own experience of yo-yo type dieting, which led them to, at the very least, believe that weight loss is possible, as well as major turning points in their life where they lost weight for good. Several participants talked about their significant other. This included people who talked about their significant other being a source of positive support as well as those who struggle with their weight or even those who pressure the participants to

regulate their eating or weight to a greater degree. Some individuals talked about their peers as having the greatest influence on their current health belief including both wanting to emulate healthy peers and wanting to avoid the negative outcomes that they have witnessed happen to their peers. Similarly, participants talked about their parents both as positive role models that they hoped to emulate, and as negative role models whose behavior they hoped to avoid. The final two categories were cultural influences and trusted sources of information. Some examples of cultural influences were social media and the thin ideal, and trusted sources of information included those participants who talked about a class, a book, a program, or even a message board as the source of greatest impact in terms of their current weight management beliefs.

**Research Question 3. How much does weight affect people's thoughts and interactions?**

Participants' responses to how often and the reasons for which they think about their weight varied greatly. Some participants reported that they barely think about weight at all, for others it depends on the day or whether they are triggered by certain situations and behaviors, whereas others had responses such as, "more than I want" or "basically all the time". The reasons for these thoughts fell into four categories: eating-related, exercise-related, other-related, and weight-event related. The most common reasons people gave were eating-related reasons. Examples of eating-related reasons were whenever one is tracking calories, when they think about what they can eat, when they feel hungry, when they have overeaten, when they are offered "bad" foods (e.g. donuts at the office), when they are too full, and when they have cravings. Participants also cited exercise-related reasons such as when they haven't met their exercise goal. Examples of

other-related reasons are how someone feels they are treated in a store or by service personnel, the way others look at them, or self-consciousness related to others, for example, being touched on the stomach by one's significant other. The weight-event related reasons were events such as looking in the mirror, stepping on the scale, or getting dressed.

Participants and their partners dealt with weight and weight discussion in a variety of different ways. Some participants do not talk about weight with their partner at all or stated that the topic was taboo, others talk with their partner about working out and health habits but not weight specifically, whereas others encourage and help each other lose weight as they both have weight loss goals. Some participants also said that they do not even bring up the topic unless their partner does. However, some individuals said their partners only bring up their own weight or insecurities. Others said their partner tells them to regulate their eating or wish they were a different weight (e.g. thinner or telling them they are overweight). Finally, several individuals said that most of the talk about weight with their partner is shared self-image or even comedic comments such as, "at least we got fat together". These conversations also included discussing what it was like when they were thinner or sharing compliments with one another suggesting that their weight is just fine as it is, whether the participant believes this is really true or not.

Participants reports of talking about weight among their close friends and family fell into three categories: we do not talk about it, self-talk, and strategy. Among those who said that weight is not discussed, examples of the reasons given were that there is a general sense that adults are responsible for themselves, that no one seems to care about weight, and that it is taboo either because the participant is perceived to have a larger

body than their social group or because they are perceived to have a smaller body than their social group. Self-talk refers to the participants' friends or family members talking about their own weight including "how fat they are" whether they truly are or are not or being worried about gaining weight. Finally, strategy refers to those who reported that most weight-related talk is about strategies they have discovered which range from new health trends, fads, or hacks that someone tried, new recipes, or even new extreme diets (e.g. only drinking coffee for a week).

When asked whether weight affects their social life, individual's responses fell into five categories: no effect at all, no effect anti-social, negative-effect avoidance, negative-effect experience, and positive effect. Those who reported no effect at all seemed to have healthy social lives that were unaffected by their weight. Some examples of comments that were coded as no effect anti-social were individuals who said that their weight does not affect their social life specifically because they are anti-social or have social anxiety that they stated was not specifically related to their weight. Those who reported negative effects that were coded as avoidant said that because of their weight they stopped seeing friends or stopped leaving the house, that being self-conscious of their weight leads them to avoid social situations, that their weight limits their ability to be in social situations with fit people, or that if they were thinner they would be more social. Those who reported negative effects said that they still go out but are aware that they are treated differently, fear judgement from others, or are given less attention when they go out. Finally, some participants, notably those who had lost weight, said that their weight positively affects their social life in that they have been able to make new fitness friends or are generally more socially involved with others since their weight loss.

**Research Questions 4: What do people wish they could change about their weight and health habits both now and in future?**

Participant's responses to whether and how they would change their health habits with unlimited time and money fell into four categories: no change, self-help, professional help, and total outsource. Notably, a number of participants said that they would not change their health habits at all, even with unlimited time and money. Responses coded as self-help included those who said that they would eat more fresh foods or special foods (e.g. bison burger rather than ground beef), cook more meals at home, buy healthier food, buy meal services (e.g. Blue Apron), buy exercise equipment, join a gym, or exercise more often. Responses coded as professional help included hiring a personal chef, a personal trainer, a nutritionist, a therapist, or a physical therapist. Finally, total outsourcing included responses such as getting plastic surgery, moving to a completely new home, or joking about buying motivation.

Finally, the future plans that participants discussed ranged from non-existent to highly specific, and fell into five categories, namely, no plans, non-weight, vague wishes, the old fashioned way, specific body goal, and specific plan. Those with no plans primarily wanted to maintain their current weight or plan either because they were happy with their weight or because of the perception that they had reached their self-regulatory limit. Those with non-weight goals talked about goals to feel better, improve their health, or focus on their mental health first. Those with vague wishes said that they wished, wanted, or would not mind losing weight, but without a specific goal, plan, or timeline. Those whose future plans were categorized as the old fashioned way had plans such as eating less and exercising more, calorie tracking, meeting an exercise goal, or staying

away from fad diets. Those with a specific body plan talked about goals such as increasing muscularity, decreasing body fat percentage, or changing their body in specific spots. Finally, those with specific weight loss plans talked about very specific idiosyncratic plans such as cutting out sugar or a fad diet. One participant specifically talked about “sauna-ing” himself in the Florida heat.

### **Study 3 Discussion**

The primary aim of Study 3 was to understand the beliefs that underlie the four subscales of the WARM as well as to understand weight mindset from a process orientation. There is little prior research in any domain on the development of weight mindset nor on the specific beliefs and events that have led people to develop the beliefs that they currently hold. When creating scales, researchers rarely interview individuals as a means of understanding whether individual’s beliefs match the researcher’s conjecture about such individuals. Moreover, one of the primary issues with past measures of weight mindset is that in addition to there being little empirical testing of the scale before dissemination, researchers have not attempted to understand the reasons why individuals believe weight is changeable or fixed(e.g. Burnette, 2010), which has contributed to researchers’ inability to theorize about the inconsistencies in the literature. For example, having a better understanding of what it means when an individual indicates that weight is changeable should contribute to researchers’ ability to understand, for example, why the belief that weight is changeable is not always advantageous.

These interviews were a first step to understanding individuals’ beliefs about weight and their body-weight related experiences to better understand how individuals’ mindsets relate to and influence their general beliefs and experiences related to body

weight as well as experiences that have led them to develop their weight mindsets. The results of Study 3 show the importance of richly examining weight beliefs in this way.

First, examining individual's beliefs related to the subscales of the WARM revealed vast differences in reasons individuals have for endorsing each of the four beliefs. Traditional work in implicit theories of weight is focused only on the outcomes of each of the weight mindsets, rather than on their development or the beliefs underlying them. However, the vast range of reasons people give for having each of these beliefs suggests that understanding individual's beliefs from a more nuanced perspective is likely to be important.

Second, these analyses make it clear that weight mindsets are not developed from any single experience, but from how an individual integrates the weight-related experiences that they have had from childhood through adolescence and even adulthood. It is also clear that some individuals develop a weight-related self-consciousness far earlier than others because of specific experiences they had or witnessed. These experiences also differentially impact individuals as they refine and even change their beliefs as they are exposed to new ideas and experiences throughout adulthood. The beliefs that people report as adults should not be thought of as abstract ideas, but rather as a product of this integration. This is likely to be one reason why individuals with the same weight mindset make such different choices. For example, one interviewee's belief that weight is changeable developed when she was a child because of her mothers' intense dieting, whereas another developed after reading an obesity-related book in adulthood. These differing paths resulted in the same belief, but these individuals exhibit very different health related behaviors and attitudes in adulthood.



Third, the extent to which weight affects individuals' everyday thoughts and interactions differs immensely across individuals from being something that they barely think about at all and that does not affect them socially to weight being something that has an impact on nearly every thought, behavior, and interaction that an individual experiences throughout the day. Differences likely have an enormous impact on an individual's ability to engage in and increase positive health behaviors and even their overall health (e.g. Umberson, Crosnoe, & Reczek, 2010) as past research shows a clear connection between social connection and positive health outcomes as well as perceived loneliness and negative health outcomes (e.g. Segren & Passalacque, 2010). This might be even further exacerbated if the loneliness results for social isolation is perceived to be caused by one's weight (e.g. Himmelstein, Incollingo Belsky, & Tomiyama, 2014; Major, Hunger, Bunyan, & Miller, 2014). It was particularly notable that for some individuals, the people closest to them were those who were creating the most hostile weight-related environments whereas for others, these individuals were their most enthusiastic supporters and cheerleaders.

Individuals' responses regarding what they would do about their weight if they had all the time and money they desired, as well as their actual future plans revealed the vast differences in individuals' general happiness as well as hopelessness with their current situation. Some individuals perceived their current situation to be so positive that they did not want to change anything about it whereas others felt so helpless that they would change nearly everything about their life as it relates to weight management, and even perhaps beyond weight management, if they were given the option.

## Limitations

Although the primary aim of Study 3 was to understand and synthesize the many idiosyncratic weight beliefs individuals hold and experiences that they have had, this method of analysis did not allow for insights to be drawn about differences across classes of individuals, which are important for advancing our understanding of the different mindset classes. However, this is the primary target of the integration analysis in the following section. Interviews are also extremely resource-heavy and time-consuming, which led to the small sample of interviews. Of course, this limits the types of conclusions that can be drawn from this analysis, but the detailed, personal information provided by even a few individuals is superior to solely researcher generated ideas about the beliefs and experiences of the individuals in any given dataset. In addition, due to non-response or simply not having enough individuals who shared their e-mail addresses in Study 2, I was not able to interview two men and two women with each mindset. Therefore, the information gleaned about some mindsets resulted from only two or three rather than four interviews.

Study 3 provided insight into the breadth of individuals' weight-related experiences and beliefs. Study 3 also provided rich insights into the beliefs that underlie individuals' responses to the four subscales of the WARM and provided an understanding of the differing weight-related experiences of beliefs of individuals across weight mindsets.

### Study 2 and 3 Integration Analysis

As a final step in the explanatory sequential design, the results from Study 2 and 3 are integrated as a means of generating new insights beyond the information gained from

the separate quantitative and qualitative results. In this case, the results of Study 2 and 3 are integrated as a means of better understanding individuals within each of the eight mindsets. The primary aim of the simultaneous examination of these results is to use the qualitative results to humanize and name each of the eight mindsets. By the end of the integration analysis, the reader should have a general understanding of what it means to be an individual with each of the eight mindsets, a sense of the perceived origin of the beliefs of individuals with each mindset, as well as a richer sense of the roadblocks or barriers to success for each class of individuals. This will be done by first explaining the findings for each mindset and then summarizing them using a joint display (see Fetters, Curry, & Creswell, 2013) whereby specific quantitative and qualitative data from each study are integrated (see Table 33).

### **Descriptions for Each of the Eight WARM-Generated Mindsets**

Rich descriptions of each of the eight mindsets were generated by combining the results of the quantitative analyses with those from the long-form interviews. Table 33 summarizes each of the eight classes. Names for each of the classes were generated by the primary researcher as an exemplar interpretation of the individuals with a given mindset. As in the discussion of Study 2, the mindsets will be presented in order from most to least content with weight for ease of interpretation.

**Class 7: Health Junky.** Two men and two women with this weight mindset were interviewed. Results from Study 2 show that individuals with this mindset strongly endorsed each of the four subscales of the WARM indicating that they are content with their weight, believe weight is changeable, are content with their access to weight

management resources, and believe that they could gain access to the weight

management resources that they need, and their BMI classifies them as normal weight.

These four individuals had all lost weight and kept it off and primarily cited this weight loss as the reason they were so content with their weight. For example, one interviewee said, “seeing that I lost that weight made me think to myself that I don't have a lot of control over a lot of things in my life, but I certainly have control over what I eat, what I put into my body”. They all, in one way or another, cited personal experience as their reason for their strong belief that weight is changeable. They all also felt that they had all the weight management resources they need, likely because they had been successful with the resources they have. Specifically, results from Study 2 show that these individuals reported the most exercise per week and least sugar-sweetened beverage consumption. Information and personal experience were the primary influences on their current weight management beliefs.

These individuals all talked about gaining weight over the years and some talked about minor weight-related incidents as children, but specifically noted that they were not bullied. For example, one interviewee said, “my brother, actually, would always say I had chipmunk cheeks. I have a very full face, and when I smile, I have these very full cheeks, so he called me chipmunk cheeks. So that kind of stuck in my head. I always wished my face was not so full. But no, nobody- I wasn't bullied, or anything like that. It was probably more in my head that I thought I was a little bit chubby”.

For the most part, these individuals do not talk about weight in their interactions with others and it either does not affect their social lives or has positively affected their social lives. However, all four interviewees noted that they think about weight multiple

times a day, as managing it is still an on-going effort. These individuals essentially would not change anything about their health habits even with unlimited time and money, and not surprisingly, do not have plans to change their weight. For this weight mindset, there were no notable differences in responses between men and women.

**Class 8: Healthy Stability.** Two men and two women with this mindset were interviewed. Results from Study 2 show that individuals with this mindset endorsed each of the four subscales of the WARM only slightly less than those in Class 7, but still indicated that they are content with their weight, believe weight is changeable, are content with their access to weight management resources, and believe that they could gain access to the weight management resources that they need. Their BMI classifies them as normal weight.

Only one of these individuals had recently lost weight, and the rest indicated that they had been relatively content consistently except for small details such as wanting to increase muscularity or fit into clothing. For example, one interviewee stated, “fairly content, but I'm a gym goer, so always trying to increase muscularity.” Their very low scores for palatable eating motives and loss of control over eating suggest that they feel stable in their relationship to eating.

These individuals tended to have started thinking about weight as a teenager, but in general could not think of any specific memory, indicating, perhaps, that there was no specific positive or negative event associated with this. For example, one interviewee said, “I guess it would've been middle school, and it was just listening to the people around me. I don't know.” Similarly, these individuals spoke about neutral or positive experiences as having the biggest impact on their current beliefs about weight, including

books, information, personal experience, and help from close others. For example, one interviewee said, “I guess the biggest would be just the facts about controlling, maintaining, losing weight. Just the facts”.

These individuals tended to not talk to their partner or friends much about weight unless those people were supporting them. Their thoughts about weight were mostly related to weighing themselves or when trying to manage what they are eating as opposed to thoughts specifically about weight or self-image. Their thoughts tended to focus on monitoring and managing their health and weight. This is likely related to individuals in this class reporting among the lowest social physique anxiety and weight bias internalization in Study 2. One interviewee even noted that he has thoughts about the fact that he no longer needs to worry about his weight. With unlimited time and money, they reported that they would exercise more and eat healthier, but for the most part, they had no future plans to change their current habits. For example, one interviewee noted that, “...it would just be healthier foods. Healthier foods”. There were again no notable differences in responses by gender.

**Class 5: Just Plain Stuck.** Two women were interviewed for this class. Only two men gave e-mail addresses and neither of them responded to the invitation to participate. Results from Study 2 showed that these individuals are moderately content with their weight, believe weight is changeable, believe that they have access to the weight management resources that they need, but do not believe that they can increase their access to weight management resources. Interestingly, although Study 2 results suggest that these individuals reported being moderately content with their weight and on average had weights that would be classified as normal weight, both interviewees spoke very

negatively about their weight, using phrases such as “hard to look at,” “I feel so ugly,” and “cottage-cheesy”. One of the women interviewed was morbidly obese while the other had a BMI that would be considered normal weight.

They both had lost weight in the past and felt that every time they do it, it becomes more difficult. For example, one stated, “I think the older that I get and the less that, I mean the more effort that I put in and the less things change, the more I'm like, ‘boy, I just think it's just a broken system, in general’”. This is reflected by the fact that they are likely putting effort into health behaviors as they report among the highest weekly exercise and fruit and vegetable consumption. Although they reported being content with their access to weight management resources, it was clear that they were lacking specific resources that they believe they needed. For example, one interviewee noted, “Counseling, dietician or nutritionist would be a really great thing”. In response to whether she could increase her access to weight management resources, another participant noted, “I don't. No, I have a few children and not a ton of money”.

Both of them also had specific weight-related memories from childhood related to their mothers and the beliefs were still playing a role in their attitudes at present. One interviewee explained, “I weighed like 180 pounds, and that's maybe the first time I was on a scale, really. And my mom like, flipped out. And I was like, ‘Oh, something must be wrong with me. Because that's not a good response... that may have been the lightest I've been, ever, in my whole life, so now I'm like, well if I wasn't good enough then, then what's even the point of anything? Like, I just... yeah, it made me feel terrible. And I still feel terrible about it’”. In terms of their current beliefs, they both felt overwhelmed by negativity. One woman believes that her husband’s negativity is the greatest current

influence on her. His reaction to her 20lb weight loss the prior year was to say, “you are a little chunky, you could keep going”. The other woman specifically stated, “I am not surrounded by evil people, I just harbor them in my brain”.

They both felt both judged by others and alone in their weight-management struggle and this seemed to even affect their ability to engage in certain health behaviors. For example, one interviewee noted, “and I'm really intimidated by gyms, because I'm super self-conscious and I don't want to go into a gym where everybody is already *not* huge, because that just intimidates me, and I just leave right away”. They both think about weight nearly all day every day and talk about their close friends and family as weight-obsessed. They both strongly wish that they will lose weight in the future, but neither are particularly hopeful that it will actually happen nor do they have a specific plan to do so. Given that only women were interviewed, gender differences could not be examined.

**Class 3: Low Priority Concern.** Two men and two women with this mindset were interviewed. Study 2 results show that individuals with this mindset have moderate levels of endorsement across the four subscales of the WARM. Interestingly, of the four individuals interviewed, one man and one woman wished to gain weight, and one man and one woman wished to lose weight. They all tended to say that weight was controllable, but all noted some version of, “but less so than society would have you believe”. For example, one interviewee noted, “I would say it's not just a cookie cutter thing where you follow this program you are going to have these results. It's every person is going to have different results based on their own individual metabolisms, their individual, you know, whatever their genetics are.”



The weight management resources they cited were all very specific such as smart phone apps or a personal trainer, and all seemed to agree that if they really wanted to reprioritize, they could get access to more of the resources that they need. However, some noted being overwhelmed by the number of possibilities. As one interviewee noted, “sometimes it's hard to find...sift through the good information versus the...not bad information, but just not very useful information. Or I don't know, to me there's almost too much information and it is hard for people to get facts about weight gain or weight loss”. Their lackadaisical approach is reflected in the findings from Study 2 in which their mean scores fell somewhere in the middle range among the eight mindsets for all outcomes except for sugar-sweetened beverage consumption and frequency of eating away from home, for which they report the second highest scores.

None of these individuals reported any notable childhood experiences related to weight. They cited varying sources of their current beliefs about weight ranging from personal experience to an inspiring college roommate. The two individuals aiming to gain weight said they thought about weight a lot throughout the day, but that these were primarily aimed at ways to gain weight. For example, one interviewee noted, “I would say it's more positive motivation. I don't really sit and stress about it. I just think hey I got work to do. I got work to do, and for me that is good because it helps me do all my other daily stuff”. The two individuals who wished to lose weight both said they had thoughts such as “I wish I was a little thinner,” about once per week. For example, one interviewee said, “Usually I walk by the mirror. I used to be thinner and now I'm not kind of thing you know.”

The three individuals who had significant others all said that they were supportive or even losing weight with them. In terms of their social life, they felt that their weight affects their confidence to some degree, but it does not keep them from actually attending or enjoying social events, and they talk about it amongst their friends very little. One interviewee noted, “No, it does not come up, like not even at all \*mumbles\* I hear the usual hey we gained weight, and like we're getting older, and then we move on. Like that is as far as the conversation goes when it comes to weight.” In terms of the future, their priority tended to be mental and physical health rather than weight, or alternatively, a wish to lose weight, but only with vague plans or noting a product they saw to help them cut cravings, although no mention of actually purchasing the product.

**Class 6: Pipe Dreamer.** Two women and one man with this mindset were interviewed although 26 men who met inclusion criteria were invited to participate. Results from Study 2 show that these individuals strongly endorsed each of the WARM subscales except the content with weight subscale, and they had a mean BMI that would be classified as overweight. They all said that they were not content and that they had been more content 5 to 10 years prior. For example, one interviewee noted, “Yes, I'd say about 5 years ago around my wedding. I was pretty content with my weight, I liked how I looked in my dress, and things like that. I could just wear styles that I liked pretty freely.”

They all see weight as changeable and cite their own personal experience with both weight loss and weight gain as well as weight loss among close others (e.g. husband). For example, one interviewee noted, “I've just had a lot of people in my life personally be very successful changing their weight through hard work, willpower, things like that.” Although they talk about having access to resources such as exercise

equipment and technology such as phone apps the focus of what they need to do to change was on getting themselves to actually, “get off my butt, “make it a priority”, or “I just need a swift kick in the ass to do it”. This may highlight why they have among the lowest reported exercise in Study 2 and the lowest reported fruit and vegetable consumption.

They all began thinking about weight in their 20s as they realized that they had gained weight. As one interviewee stated, she began noticing her weight, “after college when I discovered carbohydrates.” Those who had partners said that their partners were supportive. They all said that their close friends and family only talk about weight in the context of sharing new “hacks”, exercise regimens, or light recipes that they have tried, but never complain or talk extensively about weight in particular.

Their thoughts about weight only occurred about once per day for these individuals. None of them avoid social situations because of their weight, but they noted that they were more willing to go out and feel that they got better service when they were thinner or that it is because their friends have various weights. One interviewee noted, “My weight doesn't really make me feel uncomfortable in the situations that I want to be in. I'm not looking to become friends with Victoria's Secret models, so I don't feel uncomfortable” whereas another noted, “Well, I would say yes because, I mean, I'm the same person, but I know what it is like to be slender, get better service, get more attention...things are easier when you're thin”. Finally, these individuals were characterized by having vague future plans that included focusing on eating mindfully or to begin exercising again, but without specific goals or timelines such as, “My plan to

change my weight is, uh, working on my mindfulness.” There were no notable gender differences in responses within this class.

**Class 1: I Really “Should”.** One woman and one man with this mindset were interviewed, although all 17 women and 18 men who met inclusion criteria were invited to participate. Although these individuals are considered “normal weight”, Study 2 results indicate they are not content with their weight or their weight management resources. In the case of their weight, they acknowledge that they are not severely overweight, but do wish that they had more control of their weight. One interviewee noted, “I don't look heavy to anybody like I have a small waist and I fit most pants, I'm a 6 so I have a bigger weight but I'm very strong and muscular. I work out a lot and I wish my weight would just go lower.”

Study 2 results show that individuals with this mindset strongly endorse the weight is changeable subscale, and interview results further showed that these individuals strongly believe that it is mostly a matter of willpower. One interviewee noted, “Yes, it is controllable if one has the willpower. Which I do not have [laughs].” Study 2 results showed that these individuals are content with their access to weight management resources, and their interview responses reflected this. In terms of resources, these individuals mostly report very specific resources such as how many carbs to eat per day, calorie trackers, and exercise equipment as well as a general need for more motivation. For example, one interviewee noted, “Oh I have access to everything. Usually when I'm losing weight, I'm using a computer program to track my calories... I've got my treadmill, my weight machine”.

The two individuals that were interviewed both reported becoming conscious of their weight in elementary school, but that they did not regulate their weight until adulthood. One interviewee noted, “I fell into the traps of the 80s of having to be super thin so maybe 8 years old, 9 years old I started being obsessed so I remember growing up I wanted to be a cop because I thought cops move a lot it's a great job because you have to move chasing criminals.” However, she did not actually try to lose weight until she was much older. Specifically, she shared that “...at some point in college I gained some weight, and I was happy about it and I loved myself being chubby...then I got a boyfriend who became a fiancé and we lived together, and he was telling me you gained weight ‘blah, blah, blah’ and he was an extremely healthy eater, obsessed with being thin...he engaged in a very very healthy lifestyle, so I started that whole thing...when I lived with him.”

In terms of the extent to which weight affects these individuals on a daily basis, one of the interviewees has weight-obsessed people in her life. Her husband constantly tells her he wishes she was thinner, to which she attributes much of her weight related thoughts. On the other hand, the other interviewee does not talk to his partner about weight at all and instead his primary weight related thoughts happen as a result of feeling guilty for not exercising or for overeating. In sum, these are individuals who strongly wish that they could lose weight but feel that they are at their wits end in terms of their ability to do so. This may explain why they had among the highest scores for weight stigma, social physique anxiety, and weight bias internalization in Study 2. Although gender differences, in this case, might reflect individual differences rather than true gender differences since only one man and one woman were interviewed, the main

notable gender difference in this class was the root of their dissatisfaction rather than the dissatisfaction itself. The female participant was unhappy with the way that she looked and primarily desired to be thinner, whereas the male interviewee was primarily concerned with his health rather than specifically with his weight or the way that he looks.

**Class 4: Resources and Motivation Needed.** Two men and two women with this weight mindset were interviewed. Study 2 results suggest that these individuals are not content with their weight and believe that weight is changeable but have only moderate resources and only a moderate ability to increase access to weight management resources. The mean BMI for individuals with this mindset would be classified as obese. When they talked about their weight, they all talked about times in the past when they were more content with their weight, healthier, and better able to participate in activities. For example, one interviewee noted, “I am probably 30 pounds heavier than before I had my child, and that was 7 years ago. And I would say it is based on just the way I look and feel. You know my energy level isn't as good as it was, and then you know I do know I have to be leaner, so I don't have health problems later in life”.

They all feel that weight is controllable if they put in enough effort or could just get enough willpower and motivation. As one participant noted, “I believe I do have control, although I have no self-control.” Although they all feel that they have some resources, which is reflected in their moderate Study 2 scores on the content with weight management resources subscale, they cited barriers such as time that make weight management barely feasible even if they could find the motivation. This is particularly notable since these are barriers to weight loss that extend beyond the traditional

distinction between the belief that weight is changeable versus not changeable. For example, one interviewee noted, “I just don't have the access to a gym that is local only because I live in a rural area, and I can't stay in town where I work because I have a daughter I have to pick up.” These comments suggest that these barriers may be one of the primary reasons individuals in this class reported among the lowest weekly exercise and fruit and vegetable consumption in Study 2.

Interestingly, three of the four interviewees all talked about not wanting to end up like a person in their life (e.g. mother, wife's family) who struggles with weight or weight-related health issues as the thing that has the largest current impact on their weight management beliefs. For example, one interviewee explained, “This is going to sound really bad, but- I mean, it's not that I don't want to end up like my mom, but she's had to struggle a lot with her weight and with being- just, like, even socially but also with her health, and stuff like that. Yeah, I think about that a lot as like I don't want to get into that position.”

They all said that they think about weight often throughout the day. For example, one noted, “I would say when I get up and get dressed, I definitely think about it, and when I'm eating. Yeah, those are probably the main times when I'm preoccupied with it, but if I have a really bad body image day, it'll just be in my mind all the time.” They talk about weight vaguely with their partners, if at all, and say that among their friends it is generally a taboo topic or something that just does not come up. For example, one interviewee explained, “...we used to, but we don't anymore. She can't exercise anymore because she has too many work and family demands because her parents aren't doing

very well, so she has to spend a lot of time bouncing around. So, I don't bring that stuff up to her because I know it bothers her.”

They varied a lot in the extent to which they talked about weight as limiting their social life from it barely limiting them at all to using weight as an excuse or not even wanting to go to places like museums because of fear of weight-related judgment. For example, one interviewee who felt that it affected her life a lot explained, “Yeah, definitely. Like I said, I can kind of use it as an excuse” whereas one who felt less strongly shared that, “...the only thing I would say is like you know I don't like to go to the pool as much, but I mean other than that, no”. They all talked about changes they would make with unlimited time and money such as hiring a trainer and improving their diet. They all also talked about wanting to lose weight, and some had even made slow progress (e.g. 10 lbs in the past year) but said that they were going to have to put in a lot more effort, and worried about the longevity of their weight loss attempt if they did start. Similar to the findings from the individuals interviewed with the *I Really “Should”* mindset, the primary difference between men’s and women’s responses was that men were primarily concerned about their health or energy whereas the women interviewed were primarily concerned with being thinner.

**Class 2: Impossible to Change.** Two women were interviewed. Only one man with this mindset shared his e-mail address and he did not respond to the invitation to participate. Results from Study 2 indicate that these individuals have the highest weight among all of the weight mindsets.

Although Study 2 results suggest that they believe weight is moderately changeable and that they have moderate access to resources, they feel trapped as they do



not believe they can increase their access to weight management resources. These individuals feel overwhelmed and feel that weight management is out of their control because of both lack of willpower and for reasons that they feel are outside of their control such as a lack of physical ability or living in an area with few weight management resources. For example, one interviewee noted, “There was a time where I did feel like it was able to be controlled, because I had the willpower to control my eating, and I had the physical ability to control my exercise. However, now I feel like I exhausted the food willpower part of it, and at like, the core of me, I like pizza, I like french fries...So, I don't really have any willpower with food, I love sweets, I have dessert every night, that kind of thing. So, I have no willpower over food, so I no longer feel like food is much of anything I have much control over. And then as far as exercise goes, I just have so many injuries...”. The other similarly noted, “Yeah, that is the one thing. I definitely, maybe I should take the time out to like go you know like okay go and find something to do. But again, it is like, when I am home and I don't work and I do have some disabilities you know that keep me here, right now. They, you know time is an issue, it definitely is.”

What stands out is that even when these individuals do talk about willpower or decision making, seem to blame themselves or to think that even if weight is something that is controllable, their lack of willpower is something that is inherent to them. This finding is in line with Study 2 results which showed the individuals in this class reported the highest loss of control over eating and palatable eating motives as well as the highest consumption of sugar-sweetened beverages and highest rates of eating away from home. Both individuals started gaining weight in early adulthood and found it difficult to manage their weight since then. In addition, they primarily blame themselves and see

themselves as responsible for their current weight and responsible for their beliefs about their weight. This is notable given that Study 2 results show that individuals in this class reported among the most negative attitudes toward obese persons, the highest social physique anxiety, and the highest weight bias internalization.

Both individuals reported that they think about weight for much of the day on most days and these thoughts are negative or stressful thoughts about how they look or what they should or should not be eating. For example, one noted, “I am like I can't stand it. Like when if I see my vision in the mirror or something it is like, ‘Oh my god, how did I get like that?’”. Both individuals generally avoid talking about weight with close others. When asked what they would change about their health habits with unlimited time and money they gave responses such as I would, “do botox” or “build a swimming pool” rather than specifically addressing their health. Finally, they both wish that they could lose weight, but cited no specific plans to do so.

Table 33. *Integration analysis summary for each of the eight mindsets*

Latent Class Name	WARM Endorsement	% N	Male/ Female	BMI	Study 2 Description	Study 3 Class Short Description
<b>Class 7: Health Junky</b>	High CW High WC High CR High RC	16.5	Study 2: 46%/53%  Study 3: 2M/2F	23.14 (4.41)	Moderate/high health behavior Low unhealthy behavior Low maladaptive eating Moderate neighborhood safety Positive food environment Moderate social norms Moderate/positive weight attitudes	These are people who used to be heavier, are weight loss mentor to friends/family, self-motivated fitness/health junkies
<b>Class 8: Healthy Stability</b>	High CW High WC High CR	17.0	Study 2: 48%/52%	24.45 (4.27)	Moderate health behavior	These are people whose weight has remained stable for the

	High RC		Study 3: 2M/2F		Moderate/low unhealthy behavior Low maladaptive eating Moderate neighborhood safety Positive food environment Moderate social norms, Moderate/positive weight attitudes	last several years who generally think very little about weight but maintain relative healthy habits
<b>Class 5: Just Plain Stuck</b>	Mod. CW High WC High CR Low RC	22.2	Study 2: 35%/65%  Study 3: 2W	24.21 (10.55)	High healthy behavior Moderate/low unhealthy behavior Low maladaptive eating Moderate neighborhood safety Moderate food environment Moderate social norms Moderate weight attitudes	These individuals are not content with their weight, but perceive too many barriers, either internal or external, to changing it, yo-yo dieters, strongly want to lose weight, think about weight nearly all the time
<b>Class 3: Low Priority Concern</b>	Mod. CW Mod. WC Mod. CR Mod. RC	12.2	Study 2: 50%/50%  Study 3: 2M/2W	25.22 (8.10)	Moderate health behavior Moderate unhealthy behavior Moderate/low maladaptive eating Moderate neighborhood safety Moderate food environment Moderate social norms Moderate weight attitudes	These individuals think they, “could lose a few pounds”, but articulate that they have mostly just come to terms with their weight as it is
<b>Class 6: Pipe Dreamer</b>	Low CW High WC High CR High RC	14.2	Study 2: 38%/60%  Study 3: 1M/2W	27.97 (5.68)	Moderate/low health behavior Moderate unhealthy behavior	These individuals are not content with their weight and desire to lose weight, but ultimately do not really see it as possible for them

					Moderate/low maladaptive eating Moderate neighborhood safety Positive food environment Moderate social norms Moderate weight attitudes	
<b>Class 1: I Really “should”</b>	Low CW Low WC Low CR High RC	4.0	Study 2: 60%/38%  Study 3: 1M/1W	24.86 (12.04)	High health behavior High unhealthy behavior High maladaptive eating behavior High neighborhood safety Positive food environment Moderate social norms Negative weight-related attitudes	These individuals think that weight loss is something they “should” do, but their weight has not caused them any significant health issues
<b>Class 4: Resources and Motivation Needed</b>	Low CW High WC Mod. CR Mod. RC	11.8	Study 2: 29%/71%  Study 3: 2M/2W	30.08 (8.80)	Low health behavior Moderate unhealthy behavior Moderate maladaptive eating Moderate neighborhood safety Moderate food environment Moderate social norms Moderate/negative weight attitudes	These individuals tend to have a history of yo-yo dieting, and although they want to lose weight, they think they have too many other pressures and priorities in terms of both resources and motivation
<b>Class 2: Impossible to Change</b>	Low CW Mod. WC Mod. CR Low RC	2.1	Study 2: 15%/85%  Study 3: 2W	33.38 (9.04)	Moderate health behavior Moderate unhealthy behavior Moderate maladaptive eating	These individuals are overwhelmed by trying to lose weight to the point that they no longer believe that it will really ever happen and instead that this is just the way they are

					Low neighborhood safety Negative food environment Negative social norms, Moderate/negative weight attitudes	
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### **Study 2 and 3 Integration Discussion**

The primary aim of this integration analysis was to not only elaborate findings from Study 2 and 3 in terms of improving the richness of the descriptions of the mindsets, but also to provide evidence of how mindsets develop, are maintained, and change over time, as well as the effect this has on health behavior. Although findings from Study 2 gave preliminary evidence that the WARM mindsets do effect people's health behavior and weight loss goal striving the collection of qualitative data from Study 3 represents the voice of participants in the study, a means of understanding the phenomena as understood by the participant. For example, Study 2 revealed that individuals with a Class 4: Resources and Motivation Needed mindset are not content with their weight and are only moderately content with their weight management resources. They believe weight is changeable, and somewhat believe that they could increase their access to weight management resources. This combination of beliefs was associated, for example, with the lowest levels of self-report exercise and fruit and vegetable consumption. Study 3 provided a description of how four individuals in this class came to these beliefs and how they believe these barriers keep them from being able to manage their weight. Although there has been much research examining weight mindsets in the past, little effort has been made to understand the development and content of these mindsets, a main focus of this qualitative study.

Although it was somewhat surprising that there were not more notable differences based on gender, it may be that weight mindset better captures differences than gender. In other words, although there are different male to female ratios across classes, once within a class, gender differences are few. The main notable difference was that women were

more concerned with weight as it related to their appearance whereas men were more concerned about their weight as it related to their health and energy, but these differences were not extreme. Past research suggests that women are generally more concerned about their appearance as it related to weight compared to men (e.g. Pliner, Chaiken, & Flett, 1990).

Taken together, Study 2 and 3 provided information about the complex beliefs underlying mindsets, which should allow for the creation of weight mindset-specific manipulations or behavior change interventions that make use of the nuanced differences between mindsets by matching messages to mindsets, rather than assuming that a single message is the best for all individuals. At present, weight mindset messages and manipulations focus on changing an individual's mindset to be incremental, or more generally, to be matched to what the researcher believes is the most advantageous mindset. However, researchers have not examined whether messages espousing different mindsets are actually universally advantageous, and this integration analysis suggests that universal messages are unlikely to benefit all classes of individuals and instead should target the specific beliefs that individuals with each mindset perceive as the primary barrier to weight management.

### **General Discussion**

This dissertation makes several important contributions to the weight mindset literature. First, Study 1 resulted in the WARM, a 12-item, 4-factor, empirically validated measure of weight mindset (Study 1). The WARM is an important tool for research for several reasons. First, it provides researchers insight into the nuances of individuals' weight mindset. These insights extend beyond the existing weight mindset scales, which

measure only the extent to which individuals believe that weight is changeable. With the WARM, researchers can determine the extent to which individuals are content with their current weight and their current access to weight management resources as well as differentiate between the belief that weight is changeable and increasing access to weight management resources is possible. Prior research suggests that the interplay between individuals' perception of their current status in a given domain is an important determinant of behavior when examined along with their beliefs about the changeability in that domain (Ommundsen, 2001). The results from Study 2 demonstrate the importance of this distinction. For example, the primary difference in weight mindset beliefs between those with the *Pipe Dreamer* mindset and those with the *Health Junky* mindset is that those with the former mindset are not content with their weight and those with the latter mindset are content with their weight even though they have relatively equal endorsement of the weight is changeable subscale. Traditional theorizing in implicit theories of weight would assume that such individuals should have similar health behavior patterns; however, there are substantial differences. Those with the *Health Junky* mindset report higher levels of weekly exercise and fruit and vegetable consumption as well as lower levels of sugar-sweetened beverage consumption and eating away from home.

With the WARM, researchers can also determine the extent to which individuals believe that their weight is changeable or fixed as well as the extent to which they think that they can increase their access to weight management resources. The results of Studies 2 and 3 reveal the importance of this distinction for the prediction of health behavior and attitudes. For example, those with the *Motivation and Resources Needed*



mindset believe that the main barrier to weight management is resources, which is likely related to the low levels of exercise and fruit and vegetable consumption that they report. Those with the *Just Plain Stuck* mindset, however, believe that their own motivation is the primary barrier to successful weight management.

The WARM can also be used as a tool to locate individuals within weight mindset classes, providing insights into the behavior and beliefs of these individuals. Although there is a long history in psychology supporting the idea that individuals' mindsets have an impact on their attitudes and behavior (e.g. Ross, 1989), the growing body of research in weight mindset was becoming muddled. The results of Study 2 suggest that one reason for this is that just knowing whether someone believes weight is changeable is not enough to predict associated health behavior. More specifically, knowing the extent to which individuals endorse each of the four factors of the WARM places them within one of eight mindset categories, each of which is associated with certain health behavior patterns and health-related outcomes. For example, traditional implicit theories research would suggest that those with the *I Really "Should"* mindset would not engage in healthy behavior and would be likely to weigh more than those in other classes because they have the lowest endorsement of the weight is changeable subscale. However, it is clear from the results of Study 2 that this is not the case. Although these individuals do report some unhealthy behaviors (e.g., the highest consumption of sugar-sweetened beverages, frequency of eating away from home, and the highest scores for palatable eating motives and loss of control over eating), they also report the highest levels of two important healthy behaviors, namely exercise and fruit/vegetable consumption.

The findings presented in this dissertation also highlight the importance of examining individuals' beliefs in a more detailed and nuanced way. The results of Study 3 led to important insights about the way that individuals think about weight, how their beliefs about weight develop, and how their weight and beliefs about weight affect their daily lives, behavioral choices, and relationships. For example, those with the *Health Junky* mindset and the *Healthy Stability* mindset had relatively similar scores on the four subscales of the WARM as well as similar profiles for the Study 2 outcomes. However, interviewing these individuals revealed that those with the *Health Junky* mindset had recently lost weight and were very carefully monitoring their weight. In contrast, those with the *Healthy Stability* mindset had either always been relatively content with their weight or had lost weight many years prior. Although they engage in similar levels of health behavior and have a similar BMI to those with the *Health Junky* mindset, they are not carefully monitoring their health and weight.

The results of this research are also a first step to adding nuance to broader findings in the literature and even clarifying some disparate findings. The mindset classes that result from WARM offer distinctions that were not possible with previous measures of weight mindset. Although these studies did not specifically examine goal setting, response to challenges, response to setbacks, or goal attainment, the findings still shed some light on findings in these domains.

Results from the integration analysis reveal that goal setting, operationalized as individuals' future plans as they pertain to weight loss, is not dependent simply on whether individuals believe that weight is changeable or fixed. The single past study weight mindset and goal setting suggested that those with an incremental mindset were

more likely to set learning-approach goals, whereas those with an entity mindset were more likely to set performance-avoidance goals (Berchashvili et al., 2014). Findings from this research contribute to the literature on the relation between weight mindset and goal setting in two ways. First, all of the women in Berchashvili et al.'s (2014) study were in Weight Watchers, suggesting that they were at least somewhat discontent with their weight and also already actively engaging in trying to manage their weight. The sample used in this research included individuals of all weights and also included both those already engaged in weight management and those not engaged in weight management. This sample allows researchers to gain new insight into the effects of weight change beliefs. For example, those with the *Resources and Motivation Needed* mindset do strongly believe that weight is changeable, which should suggest that they set learning approach goals for weight management. Although these individuals vaguely talked about wanting to improve their health, they feel that they ultimately will not be able to change their weight unless their situation changes. Similarly, despite their strong beliefs that both weight and access to weight management resources are changeable, those with the *Pipe Dreamer* mindset had only very vague future plans for weight management. Those with the most specific plans for weight management were those with the *Health Junky* mindset who had already succeeded in weight loss and were carefully monitoring their weight management to sustain their weight loss.

Findings from this dissertation also begin clarify the relation between weight mindset and response to challenges. Past researchers found that those with an entity mindset were more reluctant to make specific plans for weight loss and instead talked mostly about why planning is stressful and effortful for them, perhaps engaging in self-

handicapping. Individuals with an incremental mindset were found to be more likely to plan and to view planning as a means of avoiding potential obstacles and challenges that might arise (Beruchashvili & Moio, 2013). Findings from Study 2 and 3 show that those with the strongest entity mindset, namely, those with the *I Really “Should”* mindset, may be avoiding making specific weight loss plans because they believe that they have already tried everything and have shifted to this mindset over time as they have continually failed to lose weight. These individuals have a lot of self-stigma and self-blame and are by no means avoiding responsibility for their weight. Moreover, many individuals with strong beliefs that weight is changeable did describe themselves as disengaging from challenges related to weight loss. For example, those with the *Pipe Dreamer* mindset have essentially given up on weight management despite their strong beliefs that weight is changeable.

Results from Study 2 and Study 3 also shed light on the relation between weight mindset and response to setbacks. Prior implicit theories literature suggests that those with an incremental mindset are more likely to respond with adaptive coping mechanisms such as increasing their effort in response to setbacks, whereas those with an entity mindset are more likely to engage in maladaptive coping mechanisms such as emotion-focused coping (Burnette, 2010; Burnette & Finkel, 2012). In line with this observation, the results from Study 2 show that those with weaker beliefs that weight is changeable may be engaging in coping by emotional eating in response to setbacks, as suggested by their reports of higher levels of eating for reasons other than hunger as well as loss of control over eating. However, the integration analysis suggests that the relation between weight mindset and response to setbacks is quite nuanced. For example, those with the

*Pipe Dreamer* and the *Resources and Motivation Needed* mindsets both strongly believe that weight is changeable, but results from Study 3 suggest that individuals with these mindsets have given up on weight management. This could be a result of disengagement after continued failure, which has been posited to happen to those with an incremental mindset after consistently failing in a given domain (Niiya et al., 2010). However, these results suggest that an individual may actually maintain their incremental belief over time even as this effect occurs.

Finally, results of the integration analysis also shed light on the relation between weight mindset and goal attainment. Based on general findings from research on implicit theories, one would expect that compared to an entity mindset of weight, an incremental mindset of weight should be associated with increased goal attainment. However, as noted, the results of the only longitudinal study examining the effect of implicit theories of weight on body weight showed that the incremental intervention did not lead to weight loss (Burnette & Finkel, 2012). The results of Study 2 and 3 make it clear that the belief that weight is changeable alone is not related to weight management over time as measured by BMI. There are two weight mindsets in which individuals' mean BMI would be classified as obese, namely, *Impossible to Change* and *Resources and Motivation Needed*, and these weight mindsets are characterized by moderate and strong endorsement of the weight is changeable subscale, respectively.

### **Future Directions**

One of the most important contributions of the WARM is that its specificity allows researchers to better understand the relation between weight mindset and other psychological constructs as well as the placement of weight mindset within the

psychological chain of processes that lead to behavior change. Traditionally, scholars have written about the implicit theory perspective as distinct from other health theories (Burnette, Hoyt, & Orvidas, 2017). For example, although Burnette et al. (2017) argue that the implicit theory perspective is important because it allows researchers to examine a variable that happens “earlier in the psychological chain” (p.323), it is never actually articulated where in the psychological chain weight mindset lies. Although implicit theories predict variables such as efficacy (Bråten & Strømsø, 2005), locus of control (Dweck et al., 1995), and behavioral intentions (Dweck et al., 1995), which are important predictors of health outcomes in a variety of other health models (e.g. theory of planned behavior Ajzen, 1991; the health belief model Becker, Maiman, Kirscht, Haefner, & Drachman, 1977), scholars seem to discuss weight mindset as a standalone construct that predicts a variety of distinct outcomes rather than creating a model that shows exactly where implicit theories actually fall on the psychological chain.

Future researchers can use the WARM to better understand the development of weight mindset, how mindsets are sustained and changed over time, and how they affect other weight-related attitudes and behaviors. For example, Study 3 highlight that weight mindsets result from one’s causal beliefs about one’s weight (e.g. because I have no willpower; because I have a family history of obesity; because I have no time) and one’s general causal beliefs about weight (e.g. weight is caused by lack of exercise; weight is caused mostly by genetics). However, future research should examine how these beliefs change or develop over time as well as different responses to weight-related observations, information, and messages based on one’s beliefs.

Furthermore, a process orientation allows for the study of the development of weight mindsets and the effects of weight mindset on weight management behavior. This orientation also allows for the examination of the interactions between mindset, and context, that influence the development, use, and transformation or stability of mindsets. This makes the study of why and how mindset comes to play a role in weight management behavior possible. For example, the process orientation gives rise to such questions as how, when, and why mindset interacts with messages (e.g. anyone can control their weight) and environments (e.g. at a party) relevant to weight-management behavior. It also allows for questions related to the effects of one's chosen behavior on one's representations of the self and, in turn, the stability or transformation of one's mindset.

## **Conclusion**

Together, these three studies provide evidence for a new way of measuring weight mindset, for its efficacy for the prediction of health behavior and health-related outcomes, and an understanding of the development and nature of these mindsets. The results of Study 1 show the importance of the creation of and use of a new weight mindset measure (the WARM) that includes one's self-perceptions of weight and weight management resources and distinguishes between the belief that body weight is changeable and the belief that access to weight management resources is changeable. Study 2 showed the WARM can be used to generate a set of empirically derived classes of mindsets, and that these mindsets allow for better prediction of health behavior and other health-related outcomes. Finally, Study 3 allowed for a better understanding of the development of

weight mindsets and lead to rich detailed descriptions of each of the mindsets. Together, these studies provide a new foundation for the systematic study of weight mindsets.



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## Appendix A: Study 1 Measures

### **Minnesota Weight Mindset Questionnaire WARM24 (\*Reverse coded)**

You are about to answer a series of questions about **your** beliefs about body weight. There are no right or wrong answers. We are interested in your opinions. Some of these questions might seem similar. Please answer them all.

Please rate how much you disagree or agree with each of the following statements. 1= Strongly Disagree 2= Disagree 3=Somewhat Disagree 4=Somewhat Agree 5=Agree 6=Strongly Agree

#### **Content with Weight**

CW1\_24. I am content with my current weight.

CW2\_24. I want to change my current weight.\*

CW3\_24. I feel good at my current weight.

CW4\_24. I am content with how others view my current weight.

CW5\_24. My current weight keeps me from feeling confident in the clothing I want to wear.\*

CW6\_24. My current weight makes me uncomfortable in social situations.\*

#### **Weight is Changeable**

WC1\_24. My weight is determined by factors I can control.

WC2\_24. I have a certain weight, and I can't really do much to change it.\*

WC3\_24. My weight is determined by my choices and behaviors.

WC4\_24. Regardless of what I do, I can't control my weight.\*

WC5\_24. I know if I chose to change my behavior, I could change my weight.

WC6\_24. My weight is not something I can control.\*

#### **Content with Weight Management Resources**

CR1\_24. There is too much going on in my life to make weight management a priority\*.

CR2\_24. I have access to all to the weight management information I need.

CR3\_24. I wish I had more money to devote to weight management.\*

CR4\_24. I wish that I had more people supporting me in my weight management efforts.\*

CR5\_24. In general, I don't have what I need to manage my weight.\*

CR6\_24. I don't have the time to manage my weight.\*

#### **Can Increase Weight Management Resources**

The statement "weight-management resources" refers to resources such as information, social support, money, or time.

RC1\_24. I could get access to more of the weight management resources that I need.

RC2\_24. I could find a way to increase my access to the weight management resources that I need.

RC3\_24. There are too many barriers to getting access to more of the weight management resources that I need.\*

RC4\_24. I have too much going on in my life to access more of the weight management resources that I need.\*

RC5\_24. No matter how hard I try, I can't access more of the weight management resources that I need.\*

RC6\_24. If I put my mind to it, I could increase my access to the weight management resources that I need.

\*indicates item that is reverse scored

### **Social Physique Anxiety (Motl & Conrow, 2000)**

Please rate how much you agree or disagree with each of the following statements.

1=Not at all characteristic of me 2=Slightly characteristic of me 3=Moderately characteristic of me 4=Very characteristic of me 5=Extremely characteristic of me

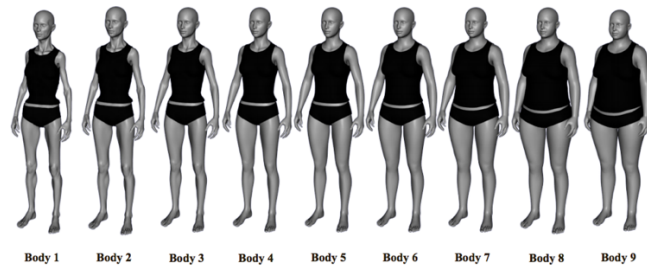
1. I wish I wasn't so uptight about my physique or figure.
2. There are times when I am bothered by thoughts that other people are evaluating my weight or muscular development negatively.
3. Unattractive features of my physique or figure make me nervous in certain social settings.
4. In the presence of others, I feel apprehensive about my physique or figure.
5. I am comfortable with how my body appears to others.\*
6. It would make me uncomfortable to know others were evaluating my physique or figure.
7. When it comes to displaying my physique or figure to others, I am a shy person.

### **Body Dissatisfaction (Mutale, Dunn, Stiller, & Larkin, 2016)**

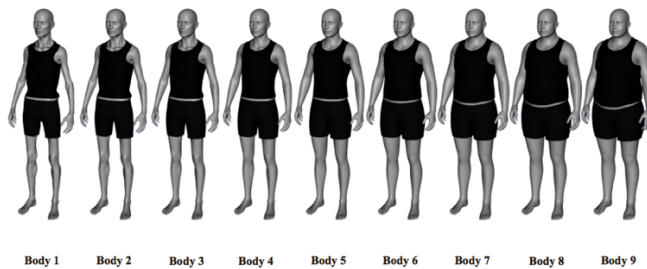
Please select the body you would most like to look like (1-9)

Please select the body you think is closest to your actual body shape (1-9).

1. Female body stimuli



2. Male body stimuli



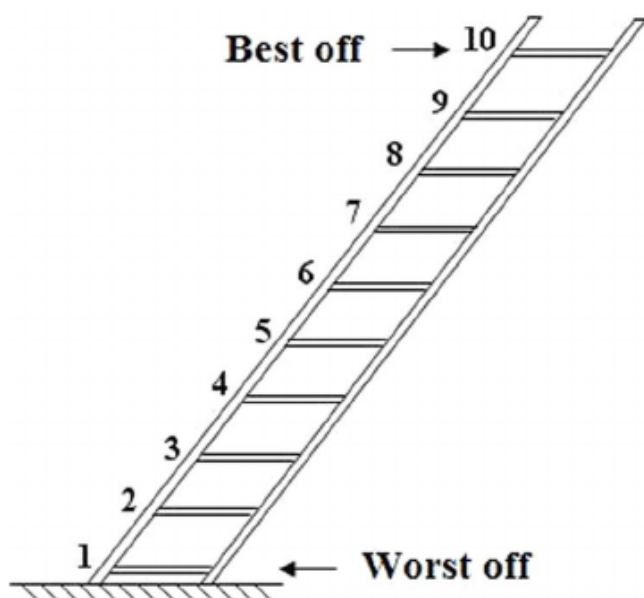
### Implicit Theories of Weight (Burnette, 2010)

Please answer the following questions using the above scale to indicate if you disagree or agree with the following statements.

1= Strongly Disagree 2= Disagree 3=Somewhat Disagree 4=Somewhat Agree 5=Agree  
6=Strongly Agree

1. You have a certain body weight, and you can't really do much to change it.\*
2. Your body weight is something about you that you can't change very much.\*
3. No matter who you are, you can significantly change your body weight.
4. To be honest, you can't really change your body weight.\*
5. You can always substantially change your body weight.
6. You can change your basic body weight considerably.

### MacArthur Scale of Subjective Social Status (Adler et al., 2000)



Think of this ladder as representing where people stand in the United States.

At the **top** of the ladder are the people who are the best off - those who have the most money, the most education and the most respected jobs. At the **bottom** are the people who are the worst off - who have the least money, least education and the least respected jobs or no job. The higher up you are on this ladder, the closer you are to the people at the very top; the lower you are, the closer you are to people at the very bottom.

*Please select the number that shows where you think you stand at this time in your life relative to other people in the United States.*

### **Weight Control Self-Efficacy (Wilson et al., 2016)**

0% = Not at all confident to 100% = completely confident

How confident are you that you could control your weight...

1. Even if you need a long time to develop the necessary routines.
2. Even if you have to try several times until it works.
3. Even if you have to rethink your entire way of controlling your weight.
4. Even if you have to make a detailed plan.

### **Generalized Self-Efficacy (Schwarzer & Jerusalem, 1995)**

Please indicate the extent to which each of the following statements is true of you.

1=Not at all true 2=Hardly true 3=Moderately true 4=Exactly true

1. I can always manage to solve difficult problems if I try hard enough.
2. If someone opposes me, I can find the means and ways to get what I want.
3. It is easy for me to stick to my aims and accomplish my goals.

4. I am confident that I could deal efficiently with unexpected events.
5. Thanks to my resourcefulness, I know how to handle unforeseen situations.
6. I can solve most problems if I invest the necessary effort.
7. I can remain calm when facing difficulties because I can rely on my coping abilities.
8. When I am confronted with a problem, I can usually find several solutions.
9. If I am in trouble, I can usually think of a solution.
10. I can usually handle whatever comes my way.

### **Satisfaction with life scale (Emmons, Larsen, Griffin, 1985)**

Please rate how much you agree or disagree with each of the following statements.

1=Strongly disagree 2=Disagree 3=Slightly disagree 4=Neither agree nor disagree  
5=Slightly agree 6= Agree 7= Strongly agree

1. In most ways my life is close to my ideal.
2. The conditions of my life are excellent.
3. I am satisfied with my life.
4. So far, I have gotten the important things I want in life.
5. If I could live in my life over, I would change almost nothing.

### **General Implicit Theories Scale (Dweck, 1995)**

Please rate how much you agree or disagree with each of the following statements.

1=Strongly disagree 2=Disagree 3=Mostly disagree 4= Mostly agree 6= Agree 7=  
Strongly agree

1. The kind of person someone is, is something basic about them, and it can't be changed very much.\*
2. People can do things differently, but the important parts of who they are can't really be changed.\*
3. Everyone is a certain kind of person, and there is not much that they can do to really change that.\*

### **Demographics**

What is your gender?

Man

Woman

Not Listed \_\_\_\_\_

Please indicate your race/ethnicity. Select all that apply.

Black/African American

European/Caucasian American

Latino/Hispanic American

Asian/Pacific Islander

Native American  
Other \_\_\_\_\_

What is your age?

What is your height in feet and inches?

What is your weight in pounds?

Which of the following do you think best describes your current weight? Please rate on the scale below:

Very Thin

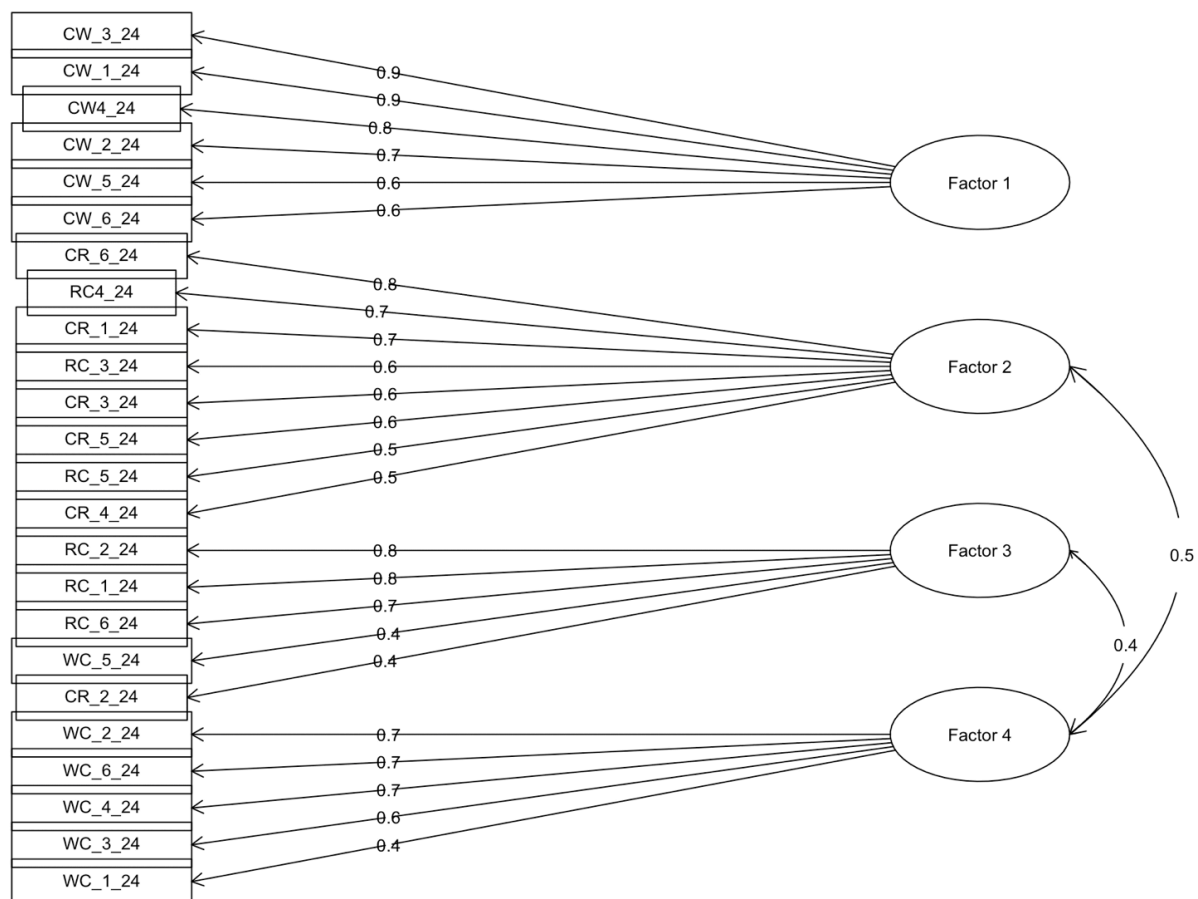
Thin

Just Right

Fat

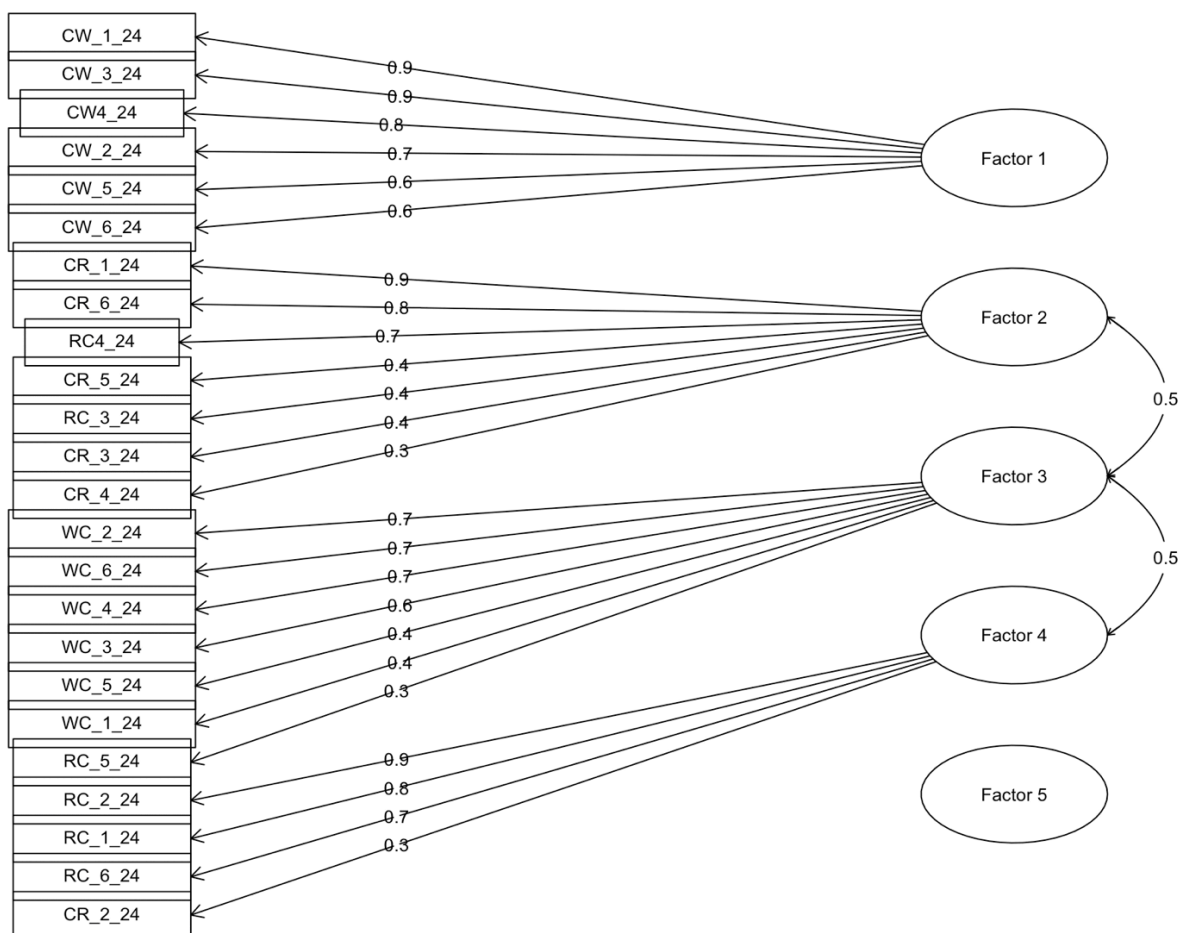
Very Fat

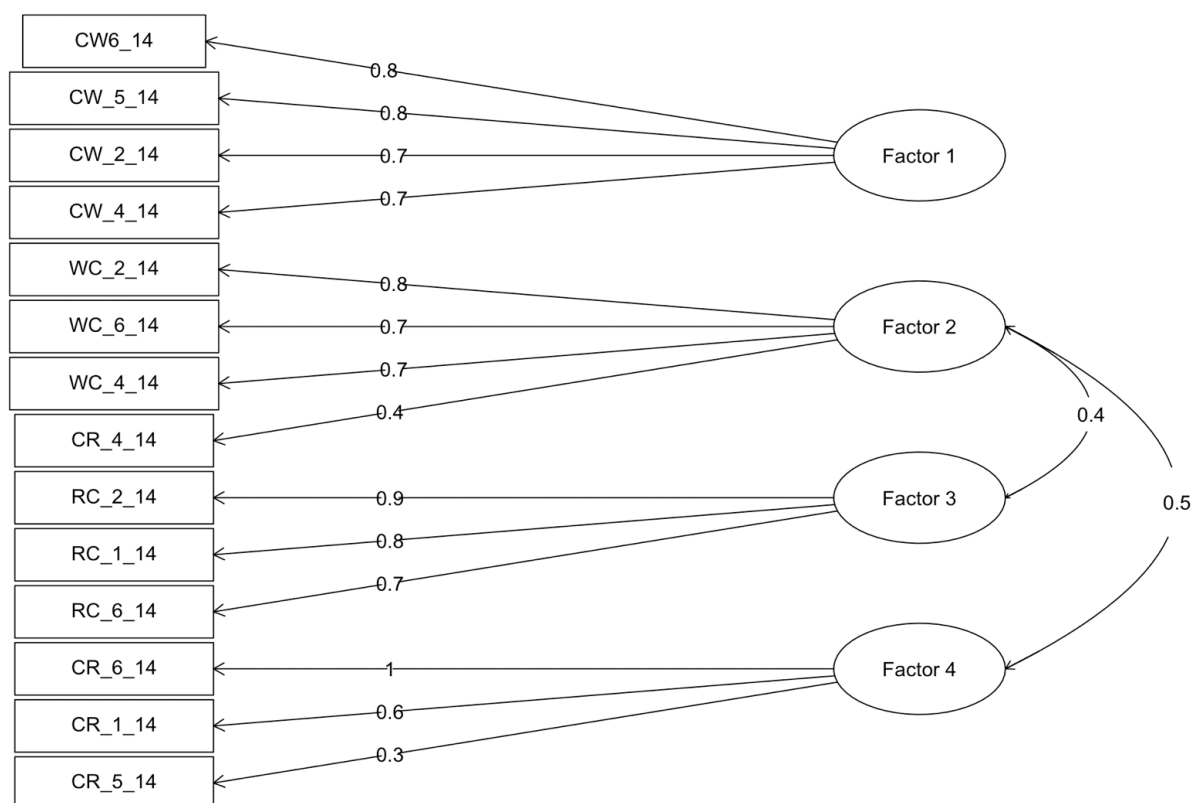
# Appendix B: Path Diagram for Study 1 Four-Factor EFA of WARM24

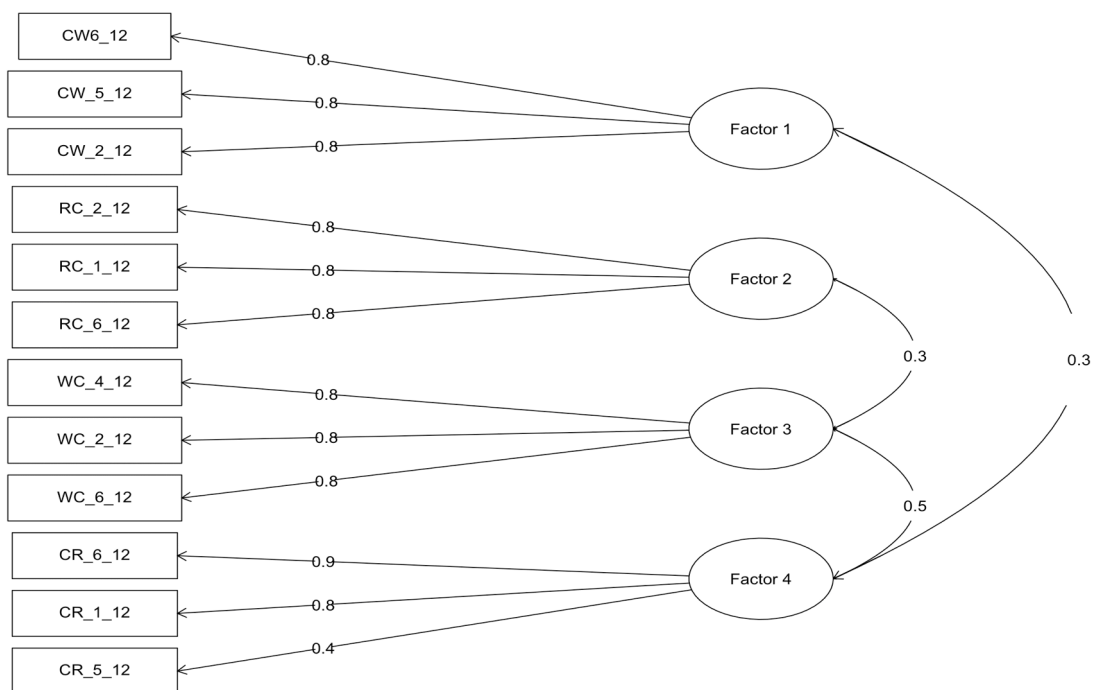


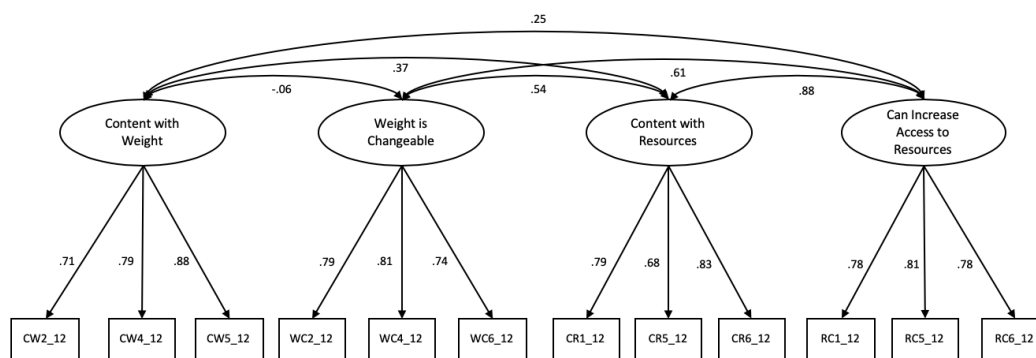


# Appendix C: Path Diagram for Study 1 Five-Factor EFA of WARM24



**Appendix D: Path Diagram for Study 1 Four-Factor EFA of WARM14**

**Appendix E: Path Diagram for Study 1 Four-Factor EFA of WARM12**

**Appendix F: Path Diagram for Study 1 Four-Factor CFA of WARM12**

## Appendix G: Study 2 Measures

### Minnesota Weight Mindset Questionnaire WARM (\*Reverse coded)

You are about to answer a series of questions about **your** beliefs about body weight. There are no right or wrong answers. We are interested in your opinions. Some of these questions might seem similar. Please answer them all.

Please rate how much you disagree or agree with each of the following statements. 1= Strongly Disagree 2= Disagree 3=Somewhat Disagree 4=Somewhat Agree 5=Agree 6=Strongly Agree

### Content with Weight

CW1. I want to change my current weight.\*

CW2. My current weight keeps me from feeling confident in the clothing I want to wear.\*

CW3. My current weight makes me uncomfortable in social situations.\*

### Weight is Changeable

WC1. I have a certain weight, and I can't really do much to change it.\*

WC2. Regardless of what I do, I can't control my weight.\*

WC3. My weight is not something I can control.\*

### Content with Weight Management Resources

CR1. There is too much going on in my life to make weight management a priority\*.

CR2. In general, I don't have what I need to manage my weight.\*

CR3. I don't have the time to manage my weight.\*

### Can Increase Weight Management Resources

The statement "weight-management resources" refers to resources such as information, social support, money, or time.

RC1. I could get access to more of the weight management resources that I need.

RC2. I could find a way to increase my access to the weight management resources that I need.

RC3. If I put my mind to it, I could increase my access to the weight management resources that I need.

### Godin Leisure-Time Exercise Questionnaire (Godin, 1985; 2011)

During a typical 7-day period (a week), on how many days do you do the following kinds of exercise for more than 15 minutes during your free time?

1=1 day to 7=7 days

1. Strenuous Exercise (heart beats rapidly)(e.g., running, jogging, hockey, football, soccer, squash, basketball, cross country skiing, judo, roller skating, vigorous swimming, vigorous long distance bicycling)

2. Moderate Exercise (not exhausting) (e.g., fast walking, baseball, tennis, easy bicycling, volleyball, badminton, easy swimming, alpine skiing, popular and folk dancing)
3. Mild/Light Exercise (minimal effort) (e.g., yoga, archery, fishing from a river bank, bowling, horseshoes, golf, snowmobiling, easy walking)

**Behavioral Risk Factor Surveillance System - Modified Fruit and Vegetable Consumption (BRFSS; Blanchard, 2009).**

These next questions are about the fruits and vegetables you ate or drank during the past week. Please think about all forms of fruits and vegetables including cooked or raw, fresh, frozen or canned. Please think about all meals, snacks, and food consumed at home and away from home. Each question will ask you how many times per day you ate or drank each one last week.

1. During the past week, on average, how many times per day did you drink 100% PURE fruit juices (e.g. orange, grapefruit)? Note: Do not include fruit-flavored drinks with added sugar or fruit juice you made at home and added sugar to. Only include 100% juice.
2. During the past week, on average, how many times per day did you eat fresh fruit? Note: Do not include fruit juice or dried fruit such as raisins.
3. During the past week, on average, how many times per day did you eat cooked beans, such as refried, baked, black, garbanzo beans, beans in soup, soybeans, edamame, tofu or lentils. Note: Do not include long green beans but include items such as bean veggie burgers.
4. During the past week, on average, how many times per day did you eat dark green vegetables? E.g. broccoli or dark leafy greens including romaine, chard, collard greens or spinach.
5. During the past week, on average, how many times per day did you eat orange-colored vegetables? E.g. sweet potatoes, pumpkin, winter squash, or carrots?

**EARLY Trials Sugar-Sweetened Beverage Consumption (Nelson & Lytle, 2009)**

1=Never 2=1 time per month or less 3=2-3 times per month 4=1-2 times per week 5=3-4 times per week 6=5-6 times per week 7=1 time per day 8=2 times per day 9=4-5 times per day 10=6 or more times per day

1. Over the *past 30 days*, how often did you drink soda or pop?
2. Over the *past 30 days*, how often did you drink fruit drinks (such as cranberry cocktail, Hi-C, lemonade, or Kool-Aid, diet or regular)?
3. Over the *past 30 days*, how often did you drink sports drinks (such as Propel, PowerAde, or Gatorade)?
4. Over the *past 30 days*, how often did you drink energy drinks (such as Red Bull or Jolt)?

**EARLY Trials Common Elements: Eating Away from Home (Nelson & Lytle, 2009)**

1=Never or rarely 2=1 time per month 3=2-3 times per month 4=1-2 times per week  
5=2-4 times per week 6=5-6 times per week 7=1 time per day 8=2 times per day 9=3  
or more times per day

1. Over the past 30 days, how many times did you buy food at a fast food restaurant, such as McDonald's, Burger King, Arby's, Wendy's, Hardee's, Captain D's, Taco Bell, Taco Johns, Chipotle, KFC, Bojangles', Pizza Hut, Panera, Quiznos?
2. Not including the fast food restaurants listed above, in the past 30 days, how many times did you buy food at any other sit down (full service) restaurant and order from a waiter/waitress?
3. Over the past 30 days, how many times did you buy food from an all-you-can-eat buffet, such as Golden Corral, CiCi's Pizza, Sweet tomatoes', Old Country Buffet, all-you-can-eat café at college or university dining halls?

**Palatable Eating Motives Questionnaire (Burgess, Turan, Lokken, Morse, & Boggiano, 2014).**

Below is a list of reasons that people sometimes give for eating tasty foods and drinks such as:

- Sweets like chocolate, doughnuts, cookies, cake, candy, ice cream, other desserts.
- Salty snacks like chips, pretzels, and crackers.
- Fast foods like hamburgers, cheeseburgers, pizza, fried chicken and French fries.
- Sugary drinks like soda, sweet tea, milkshakes, and sweet coffee drinks.

Thinking of all the times you ate these kinds of foods/drinks, how often would you say that you ate/drank them for each of the following reasons? Select the answer that best describes you.

1=Almost never/Never 2=Some of the time 3=Half of the time 4=Most of the time  
5=Almost always/Always

1. To forget your worries.
2. Because it helps you when you feel depressed or nervous.
3. To cheer up when you are in a bad mood.
4. To forget about your problems.

**Loss of Control Over Eating Scale (Latner, Mond, Kelly, Haynes, & Hay, 2014).**

In the last 4 weeks (28 days), how often have you had the following experiences during a time when you were eating? Please respond to each item using the following scale: 1=Never 2=Rarely 3=Occasionally 4=Often 5=Always

1. I continued to eat past the point when I wanted to stop.
2. I felt like I had “blown it” and might as well keep eating.
3. I felt helpless about controlling my eating.
4. My eating felt like a ball rolling down a hill that just kept going and going.
5. I found myself eating despite negative consequences.
6. I felt like the craving to eat overpowered me.
7. I felt like I could not do anything other than eat.

**MESA Perceived neighborhood Safety (Lenhart et al., 2017).**

Indicate your level of agreement with the following statements.

1=Strongly disagree 2=Somewhat disagree 3=Neither agree nor disagree  
4=Somewhat agree 5=Strongly agree

1. I feel safe walking in my neighborhood day or night.
2. Violence is a problem in my neighborhood.

**Perception of Food Environment - Perceived (Ma et al., 2013)**

For each of the following statements, please think of your neighborhood as the area within a 20 min walk or about a mile from your home.

1=Strongly disagree 2=Disagree 3=Neutral 4=Agree 5=Strongly agree

1. A large selection of fresh fruits and vegetables is available in my neighborhood.
2. The fresh fruits and vegetables in my neighborhood are of high quality.
3. A large selection of low fat products is available in my neighborhood.
4. There are many opportunities to purchase fast foods in my neighborhood such as McDonald's, Taco Bell, KFC and takeout pizza places etc.

**MESA Perceived neighborhood Safety (Lenhart et al., 2017)**

How much of a problem would you say that lack of access to adequate food shopping is in your neighborhood?

1=Not really a problem 2=Minor problem 3=Somewhat serious problem 4=Very serious problem

**Weight-Related Social Norms Scale (Leahey, LaRose, Fava, & Wing, 2011)**



How many of the following people in your social group are overweight?

1=None 2=Few 3=Moderate 4=Many 5=All

1. Causal friends
2. Relatives
3. Colleagues/classmates

**Social norms for health behavior (Pelletier, Graham, & Laska, 2014 Adapted from Project EAT; Larson, Neumark-Sztainer, Story, van den Berg, Hannan, 2011).**

Please answer each of the following using the response categories below. To what extent...

1=Not at all 2=A little bit 3=Somewhat 4=Very much

1. does your family drink sugar-sweetened beverages?\*
2. does your family eat fast food?\*
3. does your family eat fruits and vegetables?
4. does your family prepare meals at home?
5. do your friends drink sugar-sweetened beverages?\*
6. do your friends eat fast food?\*
7. do your friends eat fruits and vegetables?
8. do your friends prepare meals at home?

**Social Norms for unhealthy eating and physical inactivity (Leahey, Doyle, Xu, Bihuniak, & Wing, 2015).**

How acceptable is it among your friends to eat unhealthy foods or large portions?

1=Very Unacceptable 2=Slightly Unacceptable 3=Slightly Acceptable 4=Very Acceptable

How often do your friends encourage you to eat large portions, unhealthy foods, or have second helpings?

1=Never 2=Not very often 3=Slightly often 4=Very often

How often do your friends bring unhealthy foods or offer larger portions or second helpings?

1=Never 2=Not very often 3=Slightly often 4=Very often

How acceptable is it among your friends to not exercise?

1=Very Unacceptable 2=Slightly Unacceptable 3=Slightly Acceptable 4=Very Acceptable

How often do your friends discourage you from exercising?

1=Never 2=Not very often 3=Slightly often 4=Very often

**Attitudes Toward Obese Persons Scale (Allison, Basile, Yunker, 1991)**

Please mark each statement below in the left margin, according to how much you agree or disagree with it.

1=Strongly disagree 2=Moderately disagree 3=Slightly disagree 4=Slightly agree  
5=Moderately agree 6=Strongly agree

1. Obese people are as happy as nonobese people.\*
2. Most obese people feel that they are not as good as other people.
3. Most obese people are more self-conscious than other people.
4. Obese workers cannot be as successful as other workers.
5. Most nonobese people would not want to marry anyone who is obese.
6. Severely obese people are usually untidy.
7. Obese people are usually sociable.\*
8. Most obese people are not dissatisfied with themselves.
9. Obese people are often less aggressive than nonobese people.\*
10. Most people feel uncomfortable when they associate with obese people.
11. Obese people are often less aggressive than nonobese people.
12. Most obese people have different personalities than nonobese people.
13. Very few obese people are ashamed of their weight.
14. Most obese people resent normal weight people.
15. Obese people are more emotional than nonobese people.
16. Obese people should not expect to lead normal lives.
17. Obese people are just as healthy as nonobese people.
18. Obese people are just as sexually attractive as nonobese people.\*
19. Obese people tend to have family problems.
20. One of the worst things that could happen to a person would be for him to become obese.

**Social Physique Anxiety (Hart, Leary, & Rejeski, 1989)**

Read each item carefully and indicate how characteristic it is of you.

1=Not at all characteristic of me 2=Slightly characteristic of me 3=Moderately characteristic of me 4=Extremely characteristic of me

1. I am comfortable with the appearance of my physique or figure.\*
2. I would never worry about wearing clothes that might make me look too thin or overweight.\*
3. I wish I wasn't so uptight about my physique or figure.
4. There are times when I am bothered by thoughts that other people are evaluating my weight or muscular development negatively.
5. When I look in the mirror, I feel good about my physique or figure.\*
6. Unattractive features of my physique or figure make me nervous in certain social settings.
7. In the presence of others, I feel apprehensive about my physique or figure.
8. I am comfortable with how fit my body appears to others.\*
9. It would make me uncomfortable to know others were evaluating my physique or figure.
10. When it comes to displaying my physique or figure to others, I am a shy person.
11. I usually feel relaxed when it's obvious that others are looking at my physique or figure.\*
12. When in a bathing suit, I often feel nervous about how well-proportioned my body is.

#### **Weight Bias Internalization-Modified (Apay, Yilmaz, Aksoy, Aklin, 2017)**

Please indicate how much you agree or disagree with each of the following statements.

1=Strongly disagree 2=Disagree 3=Somewhat disagree 4=Neither agree nor disagree 5=Somewhat agree 6=Agree 7=Strongly agree

1. Because of my weight, I feel that I am just as competent as anyone.\*
2. I am less attractive than most other people because of my weight.
3. I feel anxious about my weight because of what people might think of me.
4. I wish I could drastically change my weight.
5. Whenever I think a lot about my weight, I feel depressed.
6. I hate myself for my weight.
7. My weight is a major way that I judge my value as a person.
8. I don't feel that I deserve to have a really fulfilling social life, because of my weight.
9. I am OK with being the weight that I am.\*
10. Because of my weight, I don't feel like my true self.
11. Because of my weight, I don't understand how anyone attractive would want to date me.

#### **Implicit Theories of Weight (Burnette, 2010; See Appendix A: Study 1 Measures)**

**Dieting and Weight History Questionnaire (Witt, Katterman, Lowe, 2013)**

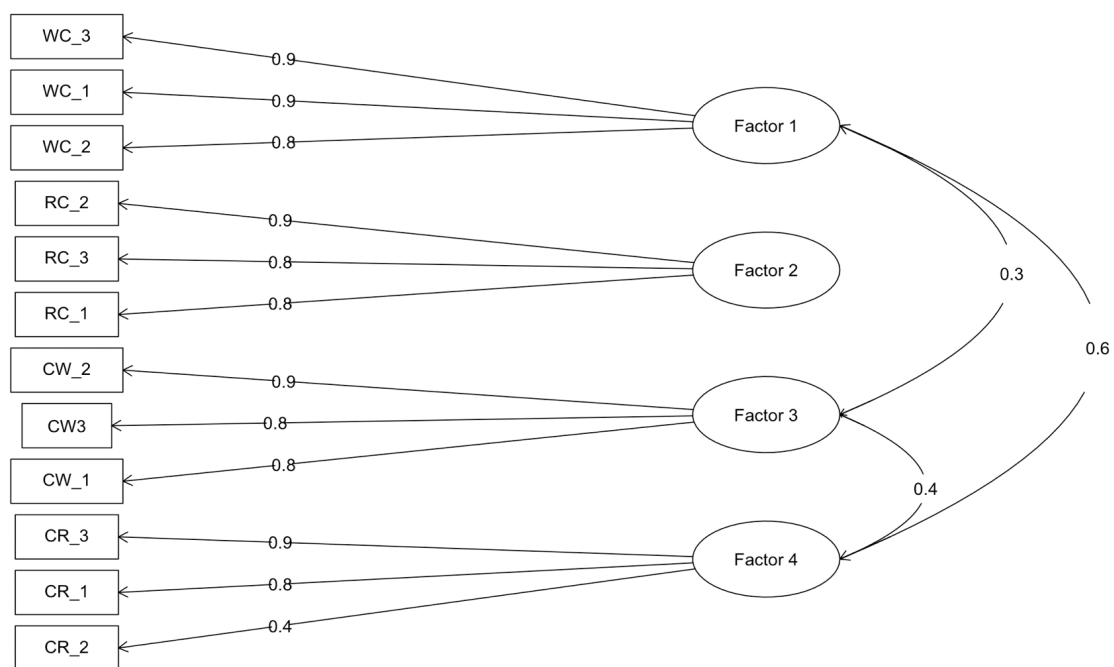
What is the most you have ever weighed since reaching your current height? The most I have weighed since reaching my current height is (in pounds):

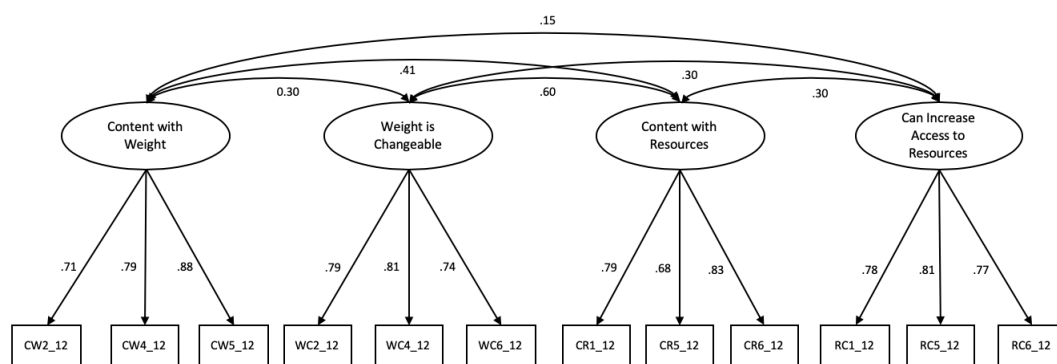
Note: Do not count any weight gains due to medical conditions or medications.

What is the least you have ever weighed since reaching your current height? (Do not count any weight gains due to medical conditions or medications). The least I have weighed since reaching my current height is (in pounds):

What is your current weight in pounds?

Are you currently on a diet? 1=Yes 2=No

**Appendix H: Path Diagram for Study 2 Four-Factor EFA of WARM**

**Appendix I: Path Diagram for Study 2 Four-Factor CFA of WARM**

**Appendix J: Item Means for 5-Class, 6-Class and 7-Class LPA Models**

	Class 1	Class 2	Class 3	Class 4	Class 5
N	128	200	209	146	176
Item					
CW1	1.89	4.18	3.14	1.52	1.67
CW2	2.1	5.2	3.49	1.72	2.19
CW3	2.2	5.54	4.07	2.1	2.83
WC1	2.38	5.46	3.9	4.74	5.5
WC2	2.36	5.63	3.97	4.42	5.56
WC3	2.36	5.62	3.88	4.76	5.53
CR1	2.35	5.17	3.94	3.05	4.79
CR2	2.42	5.58	4	3.36	5.31
CR3	2.53	5.39	4.04	3.23	5.09
RC1	4.58	4.97	3.73	3.89	5.14
RC2	4.56	4.99	3.77	3.95	5.13
RC3	4.6	5.08	3.75	4.14	5.21

	Class 1	Class 2	Class 3	Class 4	Class 5	Class 6
N	121	194	196	138	181	29
Item						
CW1	1.90	4.15	3.05	1.48	1.65	3.88
CW2	2.10	5.18	3.55	1.69	2.17	3.18
CW3	2.20	5.53	4.05	2.04	2.79	4.22
WC1	2.35	5.47	3.91	4.64	5.49	4.62
WC2	2.33	5.64	3.98	4.3	5.55	4.66
WC3	2.32	5.63	3.9	4.65	5.53	4.58
CR1	2.31	5.17	3.87	3.00	4.73	4.72
CR2	2.39	5.59	3.96	3.32	5.26	4.50
CR3	2.52	5.4	3.93	3.17	5.04	4.93
RC1	4.67	5.09	3.94	3.82	5.14	1.91
RC2	4.64	5.11	3.97	3.92	5.13	1.72
RC3	4.68	5.19	4.00	4.12	5.22	1.53

	Class 1	Class 2	Class 3	Class 4	Class 5	Class 6	Class 7
N	110	151	154	185	146	70	42
Item							
CW1	1.87	4.18	3.15	1.67	1.67	3.96	2.11

CW2	2.02	5.20	3.58	2.01	2.20	4.92	1.71
CW3	2.12	5.55	4.04	2.47	2.85	5.33	2.27
WC1	2.35	5.51	3.66	4.77	5.55	5.17	4.13
WC2	2.34	5.63	3.67	4.61	5.60	5.44	3.95
WC3	2.30	5.62	3.57	4.83	5.59	5.47	4.06
CR1	2.28	5.22	3.84	3.33	4.97	4.92	3.04
CR2	2.40	5.63	3.78	3.80	5.44	5.27	2.98
CR3	2.56	5.44	3.79	3.58	5.23	5.16	3.29
RC1	4.83	5.44	3.80	4.24	5.27	3.56	2.19
RC2	4.77	5.49	3.93	4.25	5.28	3.48	2.16
RC3	4.82	5.50	3.88	4.44	5.34	3.78	2.12



### Appendix K: Study 3 Interview

Hello, my name is Lisa Auster-Gussman. I am a researcher at University of Minnesota, and I will be conducting this interview. In general, this interview is about your beliefs about weight and health both now and in the past. There are no right or wrong answers. At times throughout the interview I may repeat questions if the question wasn't clear the first time or ask you to elaborate on your responses. Please don't worry if this happens. I just want to make sure that I fully understand your answers.

Please know that my purpose in doing this interview is not to figure out what is wrong with you or to do some kind of deep clinical analysis, nor should you think of this interview as a "therapy session" of some kind. The interview is for research purposes only, and its main goal is simply to hear what you have to say. Sometimes talking about our weight and eating can feel personal or uncomfortable. I want you to know that first of all, your name is on nothing and nothing you say can be traced to you, and secondly, I talk about weight and eating with people constantly, -- it's what I do -- so nothing you say would surprise or alarm me.

Again, there are no right or wrong answers. Everything you say is voluntary and confidential. I will guide you through the interview so that we finish it all in about 30 minutes. At times, this may mean that I have to interrupt you in order to move to the next question. This is not about your response and only about making sure we get to all of the questions.

Do you have any questions?

Are you ready to get started?

#### Reasoning for WARM Responses

1. When you think about whether you are content with your weight or not, what are you thinking about? Your weight, BMI, how toned you are, how your clothes fit, something else?

Have always been (content/not content) with your weight?

- a. If yes...
  - i. Why do you think this is the case? For example, is it because of the people around you or the health behaviors that you engage or do not engage in?
  - ii. When did you realize you were/were not content? Who or what has most influenced your beliefs?
- b. If no...
  - i. When were you most content with your weight? What do you remember most about that time? Was it related to the people

around you? Was it related to health behaviors you were engaged in? Something else?

- ii. When were you least content with your weight? What do you remember most about that time? Was it related to the people around you? Was it related to health behaviors you were engaged in? Something else?
  - iii. Think about the times your beliefs have changed? What do you think most influenced that change?
2. Have you always believed that your weight is (changeable/not changeable)?
  - a. If yes...
    - i. Why do you think this is the case? When did you develop this belief? Why do you think it has stuck? Is there any particular person or situation who influenced the development of these beliefs?
  - b. If no...
    - i. What made your beliefs change? Do you see this change as positive or negative? Is there any particular person who influenced the development of this belief?
    - ii. When you think about your previous beliefs about weight? Why did you have those beliefs? Is there any particular person or situation who influenced the development of this belief?
3. When you think about having access to weight management resources, what kind of things come to mind? What resources do you feel you do have access to and what resources are lacking?
 

Have always been (content/not content) with your access to weight management resources?

  - a. If yes...
    - i. Why do you think this is the case? Is there any particular person or situation that influenced the development of this belief?
  - b. If no...
    - i. When were you most content with your access to weight management resources? What do you remember most about that time?
    - ii. When were you least content with your weight? What do you remember most about that time?
    - iii. Think about the times your beliefs have changed? What do you think most influenced that change? Is there any particular person who influenced the development of this belief?
4. Have you always believed that you (could/couldn't) increase your access to the weight management resources that you need?
  - a. If yes...

- i. Why do you think this is the case? Why do you think this belief has stuck over time? Is there any particular person or situation that influenced the development of this belief?
- b. If no...
  - i. What made your beliefs change? Do you see this change as positive or negative? Is there any particular person or situation that influenced the development of this belief?
  - ii. When you think about your previous beliefs about your ability to increase your access to weight management resources? Why did you have those beliefs? Is there any particular person or situation that influenced the development of this belief?

### **Weight History**

- 5. Do you remember when you first started to think about weight management or your body weight? Is there any specific event or person attached to this?
  - a. What are your thoughts and feelings about this memory?
  - b. How do you think it has impacted your beliefs about weight management today?
- 6. Who or what do you think has had the biggest impact on your current beliefs about weight management? Are there any specific memories that stand out to you?

### **Current Weight Beliefs**

I am now going to ask you a few questions about your current beliefs about weight.

- 7. How much do you think about your weight on a daily basis?
  - a. Are these thoughts generally negative or positive? Can you give me some examples? For example, what comes to mind when you think about eating decisions or whether to exercise?
- 8. \*When you think about your attractiveness, how much does your weight play into your evaluation?
  - a. When you think about others' attractiveness, how much does weight play into that evaluation?

### **Current Social Network**

I am now going to ask you some questions about weight as it relates to your close social network, meaning your close friends and family.

9. If you are in any sort of partnership, do you and your partner talk about weight? If so, what are these conversations like? What do you talk about?
10. How much do your close family and friends talk about weight? How do they talk about weight? Are your friends worried about their weight or your weight?
11. Do you feel like your weight affects your social life at all? How so? It can be positive or negative.

**Behavioral Health**

12. If you had unlimited time and money would you change anything about your health habits? If so, what would you change?

**Future**

13. Thinking about the future for a moment, do you have any plans to change your weight? If so, what are they and why?
  - a. How much effort do you think this will require? How successful do you think you'll be?

**Conclusion**

14. Is there anything about this that I am missing; that I haven't asked about but should have asked about if I am to understand this topic?

Thank you for this interview!

\*Not included in present analysis